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ACUTE EMPYEMA*

BY EDWIN A. LOCKE, M.D.†

THERE would be very little opportunity for profitable discussion of acute empyema, which has so often been the subject of investigation and report in recent years, were it not for the fact that the more exact study of the bacteriology of the disease has served to alter some of our conceptions regarding its nature and the best methods of treatment. As in the case of pneumonia, the differentiation of pneumococci into various types according to their specific immune reactions necessitates a considerable revision of our interpretation of the significance of certain of the clinical features of empyema. So far as I am aware, the literature contains no record of the study of a large series of cases of empyema based on exact bacteriologic findings.

The discussion which I have to offer is based largely on our experience in the treatment of purulent pleurisy at the Boston City Hospital during a period of seven years. It is unfortunate that in the interest of accuracy and completeness it has been necessary to discard a large number of cases of empyema because of the incompleteness of the records. Except in this respect no selection in the choice of cases has been made. In all we have brought together 478 cases. During the entire period of seven years the bacteriologic examinations were made by the same highly trained individual, a consideration of no small importance when one considers the expert character of such laboratory work.

Our interest in this study has been primarily to determine any relation which may exist between the type organism and the nature and course of the disease. Does the biological classification of pneumococci, for example, give us any indications by which we may predict the probable outcome of the pleural infection more accurately? In other words, does an accurate knowledge of the bacteriology of the given case afford any practical clinical assistance in treating the patient? We believe we can present evidence which justifies an affirmative answer. It seems possible to a considerable degree to correlate certain features of the clinical picture, the course of the disease and the response to treatment with the type organism causing the pleural infection.

*Read at the meeting of the American Climatological and Clinical Association, Quebec, May 13, 1930.

†Locke—Visiting Physician and Chief of Fourth Medical Service, Boston City Hospital. For record and address of author see "This Week's Issue", page 438.

GROUPING OF ACUTE EMPYEMA ACCORDING TO THE PRIMARY DISEASE

It has been an easy task to separate the cases developing with, or following, lobar and broncho-pneumonia, but when this is done, there remains a large number of patients who enter the hospital because of empyema which has already developed. The vast majority of this group give a characteristic history of pneumonia which antedated the empyema, but one does not usually feel justified in attempting to differentiate an earlier lobar and bronchial-form. For want of a better term we have grouped these cases under the heading "Post Pneumonia". In a small group of five cases we have no evidence regarding any antecedent disease.

The occurrence of empyema with such miscellaneous conditions as suppurative lesions both within the thorax and elsewhere in the body, infectious diseases, trauma, etc., has not been found in a single instance in this series.

Considerable attention is sometimes given, in the description of empyema, to the so-called primary or idiopathic form. It seems extraordinary that in such a large series of cases from a general hospital and over a period of seven years no unmistakable example of this type has been found. At least a partial explanation can be offered by the fact that no definite tuberculous empyema was found, the type of infection conceded to be the most common cause of the primary form. Above all, it is surprising that so large a percentage of the cases should turn out to be definitely secondary to pneumonia in some form.

In Table I, 478 cases are grouped according to the primary disease and the organism present in the chest fluid.

The figures given in this table indicate very clearly, in a general way, the relative importance of the various groups. There is a total of 245 cases, or 52 per cent., secondary to lobar pneumonia; 182, or 38 per cent., in the post pneumonia group; 46, or 9 per cent., following broncho-pneumonia; and 5, or 1 per cent., without known primary disease.

BACTERIOLOGY OF ACUTE EMPYEMA

The most important facts regarding the relation of the various organisms to the several groups as given in Table I are summarized in Table II.

The figures presented in this table appear to

show very definite results as regards the occurrence of the various organisms in the different groups. In empyema occurring after lobar pneumonia the pneumococcus is the invading organism in nearly all cases (80.5 per cent.) while the hemolytic streptococcus infection represents only a small percentage of these cases (11 per cent.). The former shows a striking decrease in the post-pneumonia group (56.4 per cent.) and a still greater one in the broncho-pneumonia group (36.5 per cent.), while the course of the hemolytic streptococcus curve is exactly the opposite (11, 29 and 49 per cent., respectively). Among the various types of pneumococci, type 1 stands out predominantly in the lobar pneumonia group, constituting 55.7 per cent. of all cases, dropping to 44.3 per cent. in the post-pneumonia group and to 19.5 per cent. in the broncho-pneumonias. In 48.9 per cent. of all cases the pneumococcus type 1 was the infecting organism. There are 277 cases in the four groups due to pneumococci of determined type, distributed as follows: Type 1, 73 per cent.; Type 2, 9 per cent.; Type 3, 4.6 per cent.; and Type 4, 13 per cent. Combining all cases of known bacteriology, 68.3 per cent. were due to the pneumococcus and 21.1 per cent. to the hemolytic streptococcus.

The only other common organism found in the pleural fluid in this group of empyemas was the staphylococcus aureus, which occurred in pure culture twenty-five times among 478 cases. The same organism was obtained from the pleural exudate in four cases of pneumococcus empyema. The figures suggest that staphylococcus infection is not a common infection in empyema.

The group of 61 undetermined cases are largely those in whom the culture of the chest fluid was negative (37 cases). Mixed infection was found in a very few cases, but seems to offer no obstacle to definite bacteriologic grouping.

This series of empyema cases is large enough, we believe, to warrant fairly definite conclusions of this sort as applying to the usual conditions in civilian hospitals. Under abnormal conditions, as during the last influenza epidemic or in the army camps during the 1918 epidemic of streptococcus pneumonia, entirely different and extremely variable ratios between the pneumococcus and hemolytic streptococcus groups have been shown.

In consequence of such considerations as those given above, it has become common practice to speak of two principal etiologic types of empyema, namely, one due to the pneumococcus and the other to the hemolytic streptococcus. Such a classification becomes more significant when it is recalled that lobar pneumonia is usually due to pneumococcus infection while broncho-pneumonia is equally prone to be caused by the streptococcus. The chief objection to such a grouping is the impossibility, in many instances, of distinguishing between these two types of pneumonia.

These two common types of secondary empyema usually present quite distinct characteristics. These are so well known as to merit only brief mention. The most important feature of the first type (pneumococcus) is its occurrence as a sequela of the pulmonary infection, the so-called metapneumonic form of empyema. The symptoms are seldom severe, often practically absent, and the patient's convalescence from the pneumonia may at first even appear to be progressing quite normally. In the beginning the fluid is only turbid, but within a comparatively few days becomes distinctly purulent and

TABLE I

EMPYEMA INCIDENCE AND CASE FATALITY

Organism	Lobar Pn.		Post Pn.		Broncho Pn.		Unknown		Totals		Fatality Rate
	No. Cases	No. Died	No. Cases	No. Died	No. Cases	No. Died	No. Cases	No. Died	No. Cases	No. Died	Per Cent.
Pneu. Type 1	126	12	66	6	8	4	2	1	202	23	11.
" " 2	18	6	5	1	2	2	0	0	25	9	36.
" " 3	8	4	3	0	2	1	0	0	13	5	38.5
" " 4	23	6	10	3	3	2	1	0	37	11	29.7
" not typed	7	2	0	0	0	0	1	0	8	2	25.
Totals Pn.	182	30	84	10	15	9	4	1	285	50	17.5
Hem. Strep.	25	8	43	7	20	15	0	0	88	30	34.
Non. Hem. Strep.	4	0	12	1	2	0	1	0	19	1	5.2
Staphy.	11	3	10	1	4	2	0	0	25	6	24.
Undetermined	23	9	33	11	5	4	0	0	61	24	39.3
Totals	245	50	182	30	46	30	5	1	478	111	23.2

TABLE II

PERCENTAGE OF ALL CASES (478) DUE TO PNEUMOCOCCUS (ALL TYPES), H. STREPTOCOCCUS AND PNEUMOCOCCUS TYPE 1

Organism	L. Pn. %	Post Pn. %	Br. Pn. %	Totals %
Pneumococcus all types	80.5	56.4	36.5	67.6
Hem. Streptococcus	11.	29.	49.	20.9
Pneumococcus Type 1	55.7	44.3	19.5	48.9

finally of a thick, creamy consistency and with a yellow-green color, frequently streaked with brown or red. It is sometimes fetid in odor. The accumulation of the effusion in these cases is gradual, often requiring a week or even ten days for full development if the amount is large. Our experience indicates that this form is more apt to be encapsulated than is the empyema of streptococcus origin. When tapped, the pus reaccumulates, but comparatively slowly. At times the exudate is so thick and contains so much fibrin that paracentesis is difficult or impossible. It is important to remember that sedimentation can occur, especially in cases of long standing without operation, the upper portion of the cavity containing turbid or clear fluid while below there is a thick, mudlike deposit of pus cells. Not infrequently fluid of this type will be found sterile on culture although the organisms can be demonstrated in the smear.

In sharp contrast to the above, streptococcus empyema develops coincidentally with the pneumonia, thus adding materially to the toxicity and general seriousness of the patient's condition. It is difficult to state just how early in the course of the pneumonia the pus can form, but its presence has been demonstrated during the first few days and there is good reason to believe that the infection of the pleura and lung are essentially simultaneous. Broncho-pneumonia, and especially the primary epidemic form, is essentially a septic process and prone to develop multiple intrapulmonary abscesses, which indicates a probable early infection of the pleura as well. Because of its occurrence with the pneumonia the detection of the fluid is not always possible. A particularly striking feature is the almost incredible rapidity with which very large amounts of pus can form or reaccumulate following thoracentesis. The exudate is, from the first, of a thin, dirty, cloudy appearance, but later may become thick or even creamy. It is usually stated that the streptococcus empyema is much more commonly associated with focal infections elsewhere in the body than is the case with the pneumococcus form. This is evidently true of the empyema occurring in the primary epidemic broncho-pneumonia, but with the usual hospital type we have found such complications less common than with the pneumococcus, type 1 infection of the pleura. While no real clinical forms can be described as absolutely distinctive of these two bacterial types, they are, nevertheless, quite unlike in the respects mentioned and should be considered separately in discussing certain considerations of prognosis and treatment.

A brief summary of two cases will serve to illustrate the two forms just described.

C. O'R., a man of 38. Onset with severe chill four days before admission, followed by intense cutting pains in the right lateral thorax, cough and fever. At entrance the patient was very toxic and wildly delirious. There were definite signs of lobar pneumonia in the right upper lobe. The sputum showed pneumococcus type 1. On the second day after entrance the temperature had reached 98, where it remained for six days. Meanwhile the patient's condition improved greatly and gave every appearance of a normal convalescence. The w.b.c. dropped from 27,500 to 23,000 and finally, at the end of ten days, to 16,000, at about which point it remained. Resolution took place promptly, but signs of encapsulated fluid at the right base near the spine gradually developed and thoracentesis was finally done eighteen days after the temperature became normal. About 250 cc. of thin, yellowish pus was obtained (pneumococcus, type 1). There were no evidences of reaccumulation of the pus, indicating permanent drainage, and the patient remained symptom-free. X-ray showed the chest clear; the leucocyte count gradually fell to normal; and the patient was finally discharged well, eight weeks after entrance.

I. C., a woman of 23. Two weeks prior to admission the patient had a mild upper respiratory tract infection without cough. Seven days later she had a chill with intense headache, malaise, and pain in the muscles of her back. Temperature 102; dry cough. Three days later there was sudden, intense knife-like pain in the right lower axillary region. At entrance she had very severe constant pain with muscle spasm and acute tenderness in the right lower abdomen, which had led to a pre-admission diagnosis of acute appendicitis. The presence of slight dullness with numerous râles in the right lower back, together with the general picture of a respiratory infection, indicated a probable broncho-pneumonia and the patient was admitted to the medical wards. More typical symptoms of broncho-pneumonia quickly developed and the disease ran an extremely severe course. From the onset there was very intense hyperesthesia over the right lower back, the entire right front of the chest, and down over the right abdomen.

W.B.C. 15,000. No sputum obtained. Blood culture negative.

Three days after entrance signs of a large effusion at the right base developed and were confirmed by x-ray. The patient's condition was very critical. On the seventh day 1700 cc. of thin, dirty, slightly greenish pus was obtained by paracentesis of the right chest, with great relief of dyspnoea. Pus gave pure culture of H. streptococcus. About 500 cc. of pus were withdrawn at three, six and ten day intervals, each giving a pure culture of the same organism except the last, which was much thicker and sterile. The patient showed steady and striking improvement with this series of tappings. Three days after the last, or twenty-three days after entrance, permanent closed drainage was done. The patient made a prompt and complete recovery.

RELATION BETWEEN THE BACTERIOLOGIC FINDINGS IN THE SPUTUM AND PLEURAL EXUDATE

On the whole, there is less disagreement between the bacterial findings in the sputum and pleural fluid of our cases than one would imagine. The mouth organisms, so-called (types 3 and 4), especially pneumococcus type 4, are more common in the sputum of our cases than types 1 and 2 and appear to be of very questionable significance as concerns the bacteriology of the chest fluid. In many of these cases in which type 4 is reported in the sputum, for example, the pus from the chest cavity gave a pure culture of hemolytic streptococcus. If, however,

the type 1 pneumococcus was found in the sputum, the pleural fluid almost invariably showed type 1 also. The correspondence between sputum and pleural fluid findings in the case of type 2 pneumococcus was somewhat less definite, although the number of cases observed is too small to permit general conclusions. These variations in the bacterial findings in the sputum and pus from the pleura are well illustrated in the following table:

TABLE III

36 Cases Pneumococcus Pneumonia Showing Lack of Correspondence Between Bacterial Findings in the Sputum and Pleural Exudate

Number	Sputum	Number	Pleural Exudate
4	Pneumococcus Type 2	3	Hem. Streptococcus
		1	Staphylococcus Aureus
1	Pneumococcus Type 3	1	Hem. Streptococcus
31	Pneumococcus Type 4	14	Hem. Streptococcus
		1	Non. Hem. Streptococcus
		8	Staphylococcus Aureus
		8	No growth
36		36	

INCIDENCE OF EMPYEMA BY AGE, SEX AND SEASON

The incidence of empyema at the different age periods have been carefully tabulated. Approximately 30 per cent. occurred in children under 10 years. For the next two decades the numbers were about the same but increasing sharply to a maximum in the decade 30-39, to fall quite abruptly to zero during the next three decades. It appears very evident that the majority of cases of empyema occur before the age 40 (76 per cent. in our group).

Several interesting facts regarding the relation of age to the incidence of the empyema of the various types are brought out in Table IV. It is clear that empyema due to the type 1 pneumococcus is a disease of very young people, the average for all cases for both sexes being 19 years. The average age for the other types of pneumococci is strikingly higher, especially for types 2 and 3. In type 3 the average age for both sexes is nearly the same and for both combined is 45 years. This is quite in accord with Cecil, Baldwin and Larsen's[1] statistics of pneumonia, which show an increasing incidence of type 3 with each decade. Cecil speaks of this form of pneumonia as the characteristic infection among the elderly, just as is type 1 among young people. The cases of empyema due to type 4, streptococci, and staphylococcus are also shown to develop in the relatively young with an average age varying from 24 to 28 years.

The chart shows a ratio of males to females of about 2¼ to 1. It is interesting that pneumonia among 2000 cases studied in Bellevue Hospital gave a ratio of about 6 to 1.

The incidence of empyema over the period of seven years covered by this study shows a fairly uniform curve, but when tabulated by months there is a very significant trend. January, February, March and April are distinctly the empyema months. During the next few months the curve is downward, reaching the minimum during July, August and September. Finally, there is a gradual rise during the last three months of the year. This corresponds very closely with the well-known pneumonia curve, on which it is obviously dependent. We are unable to discover evidence of any significant variation in the case fatality rate during the different seasons of the year.

TABLE IV

Organism with Reference to Sex and Average Age (478 Cases)

Organism	Sex		Average Age		Average Age
	M.	F.	M.	F.	M. & F.
Pneu. Type 1	143	59	20½	15	19
" " 2	21	2	38	38	38
" " 3	5	8	48	43	45
" " 4	29	8	31	20	28
Hem. Strep.	51	37	27	26½	27
Non Hem. Strep.	13	5	27½	17½	24
Staphy.	20	9	27	28½	27½
Undetermined	47	21	35	26	32
Totals	329	149			

THE LOCATION AND FORM OF EFFUSION

Our studies regarding the location and form of the effusion have brought out no new facts. The two pleurae are almost equally involved and we find no variations corresponding with type of organism, age period or sex except such as may reasonably be attributed to chance.

In eleven instances there was a bilateral pleural infection. Seven of these were secondary to lobar pneumonia, one was in the post-pneumonia group and three with broncho-pneumonia. Pneumococcus type 1 was the organism present in four cases, while the remaining seven were scattered among the other bacteria mentioned. The seriousness of the double pleural infection is indicated by the fact that seven of the eleven cases died.

Combining all groups, we find that the percentage of massive effusions seems to vary insignificantly with all types of organisms except the streptococcus hemolyticus, where the relation is outstanding. The fluid is recorded as massive in 75 per cent. of these cases but only 30 per cent. of all others. In contrast to this clearly defined tendency for the hemolytic streptococcus cases to form a massive effusion, the pneumococcic fluid shows an equally definite tendency to

become encapsulated. This difference is clearly explained, we believe, by the characteristics of the two types of infection described earlier in this paper. The pneumococcic effusion develops very slowly after the inflammatory process in the lung has subsided and offers the most favorable conditions for the formation of adhesions, while the other form of infection is violent, occurring at the same time as the pneumonia, and with the effusion developing so rapidly that plastic changes in the pleura do not have a chance to form.

It has been impossible to obtain any exact data regarding the amount of fluid and the character of the pus cavities since practically all cases were permanently drained by the closed method, which offers no opportunity for such observation. Such information as we have is derived from the x-ray examinations, physical signs, and the findings with thoracentesis.

The exact location of the encapsulated fluid is a matter of some general interest and particular importance as concerns the operative procedures. Approximately 75 per cent. of all encapsulated fluids were at the lower and posterior portion of the pleural cavity. Not infrequently a smaller or larger amount accumulates in the gutter of the spine, giving signs, if present, below and inside the inferior angle of the scapula.

CLINICAL FEATURES

The variations in the pulse rate at different ages seem to be significant. The highest median pulse rate is in the age period 1-9 years, while the lowest is in the decades 30-39 and 40-49. The median pulse rate for females (126) is slightly higher than for males (123). The average pulse rate for those who died and for those who survived appears to be practically the same.

We have determined the median leucocytosis counts and studied their relation to the age. There seems to be no noticeable relation between the two. The degree of leucocytosis is almost uniformly high. There were no cases with less than 5000 and only 23 less than 10,000 per cu. m.m. Ninety-five per cent. of all cases were between 10,000 and 50,000. We find a very surprising absence of any relation of case fatality to the degree of leucocytosis, i.e., the average leucocyte count for those who died does not differ from the average for those who recovered. The patient with a leucocyte count of 5000 seems to have as good a chance of recovery as the one with 40,000.

Tabulation of the leucocyte count during the pneumonia and after the onset of the empyema showed no constant trend. In 36 per cent. of the cases the degree of leucocytosis remained essentially the same, in 42 per cent. the number of leucocytes fell, while in 21 per cent. the numbers were increased. From the diagnostic point of view the significant thing is not the upward or downward trend of the leucocytes but the fact of its persistence above the normal level.

Complications are exceedingly common in empyema if one includes all of the many abnormal conditions which occur with it. In our experience, on the other hand, there have been many fewer true complications than are usually described as occurring with this condition. The true complications comprise, essentially, focal infections in various parts of the body, the principal ones being as follows:

Broncho-pleural fistula	49	Cases
Miscellaneous abscesses	44	"
Acute pericarditis (fibrinous, sero-fibrinous and purulent)	16	"
Lung abscess	15	"
Nephritis	7	"
Erysipelas	7	"
Septic infarcts lungs, kidneys, and spleen	4	"
Acute infectious arthritis	4	"
Emboli (cerebral and coronary)	4	"
Phlebitis	3	"
Acute appendicitis	2	"
Acute endocarditis	2	"
Osteomyelitis	2	"
Pyelitis	1	"
Peritonitis	1	"
Meningitis	1	"
Adenitis	1	"
Tonsillitis	1	"

In addition, our series shows such occasional non-septic complication as massive collapse of the lung, pulmonary tuberculosis, auricular fibrillation, toxic jaundice, and miscarriage.

In all, complications have occurred 265 times in 478 cases of empyema. The part played by the various types of organisms in the septic complication is difficult to determine. It seems evident that the type 1 pneumococcus far exceeds all others in importance in this respect. The hemolytic streptococcus is next in importance and shows a slightly greater tendency to form small pockets in the thorax and abscesses in the lungs. A bacteriological study of the forty-nine cases of pleuro-bronchial fistula yields the following:

Pneumococcus Type 1	21	Cases
" " 2	2	"
" " 3	3	"
" " 4	3	"
Hem. Streptococcus	5	"
Non. Hem. Streptococcus	2	"
Staphylococcus Aureus	4	"
Mixed infection	2	"
Undetermined	7	"
	49	"

Cecil, Baldwin and Larsen found systemic disease especially associated with cases of type 3 pneumonia and a death-rate in all cases of pneumonia associated with chronic systemic disease double that of cases without such association. Our series of empyema cases do not show any definite tendency for the type 3 infections to occur in association with systemic diseases, but in general the death-rate is excessive in the group of empyemas complicated by chronic dis-

ease. There were a total of 19 such cases with a death-rate of 54 per cent.

A blood culture was done on 185 of the total 478 cases and the results are given in Table V. Several important considerations are indicated. Fifty-eight, or 31.3 per cent. of all cases, were positive; 127, or 68.7 per cent., negative,—a ratio which is almost identical with Cecil's for the positive and negative results of the blood cultures in pneumonia (27 per cent. and 73 per cent). The percentage death-rate for the positive group (32.7) seems surprisingly low since the group of pneumonias referred to showed 83.1 per cent. for the positive cases. The mortality rate for the negative group is 17.3, which, strangely enough, is practically the same as for the negative pneumonia group. The pneumococcus empyemas without bacteremia (63 cases) appear to have a definitely lower mortality (12 per cent.) than does the whole negative group. It seems a fair conclusion that in empyema a bacteremia is of only moderately serious prognostic significance, as the case fatality in this group is less than twice that for the group without bacteremia and but slightly above that for all cases of empyema. It is evident, furthermore, that death in empyema is to a considerable degree independent of septicaemia.

TABLE V

RESULTS OF BLOOD CULTURE IN 185 CASES EMPYEMA

Organism	Total Number	Blood Culture Positive		Blood Culture Negative	
		No. Cases	No. Died	No. Cases	No. Died
Pneu. Type 1	75	30	7	45	4
" " 2	10	6	3	4	1
" " 3	8	4	3	4	1
" " 4	17	7	1	10	2
Total Pneu.	110	47	14	63	8
Hem. Strep.	38	6	4	32	6
Non. Hem. Strep.	4	0	0	4	0
Staphy. Aureus	13	5	1	8	1
Undetermined	20	0	0	20	7
Totals	185	58	19	127	22
Per cent.		31.3	32.7	68.7	17.3

MORTALITY AND RESULTS OF TREATMENT

One should never lose sight of the fact that empyema is almost always secondary to a serious infection of the lungs and itself must be regarded as a septic complication. When attacked with the infection of the pleura, the patient is already weakened by the previous pneumonia and handicapped in so far as physical resources are concerned. Again, too often, as shown above, the process in the pleura is only part of a general septic condition or, at least, associated with septic foci elsewhere in the body. These considerations make it evident that the mortality in empyema must, at best, be relatively high. The general case fatality rate of our entire group is 23 per cent. Many factors determine the number of deaths but chief among them the age of the patient, type of organism present in the pleural exudate, and the method of treatment.

The influence of age on the outcome of the disease must be moderately significant but is impossible to determine accurately except in a much larger series than ours. The tabulated results seem to indicate that, on the whole, the younger age groups, except for those under ten years, have a consistently lower death-rate than the older age groups, although the steady increase in mortality with each decade is much less constant than is the case with pneumonia. On the whole, it is safe to say that older people have a poorer prognosis.

The fatality rate with respect to the type of organism found in the pleural fluid varies greatly and probably significantly. (See Table I.) Type 1 has a much lower rate than any of the other groups, namely, 11.3 per cent. for 202 cases. This fact is of the greatest interest when it is recalled that this type caused nearly 50 per cent. of all our empyemas and has been shown to be especially prone to cause focal infections. Types 2 and 3 have a fatality rate of 36 and 38.5 per cent., respectively, or more than three times that due to type 1, while type 4 is 29.7 per cent. For the entire group of 285 pneumococcus empyemas the case fatality rate is 17.5 per cent.

So far as the particular method of surgical treatment and its influence on the outcome of the discussion is concerned, we have had very little opportunity for observations, as a single method (closed drainage) has been almost exclusively employed. Our observations of the treatment of these cases for many years leaves us with the conviction that success in the treatment of empyema depends much more on the resourcefulness, judgment and conscientiousness of the surgeon than on the particular surgical method employed.

Sixty-two of the 478 cases in our series were not treated surgically and a close analysis of this group yields some interesting results (Table VI). Forty-four of the 62 cases died, a mortality of 72.6 per cent. When separated according to the organism found in the chest exudate, the various groups present a surprisingly uniform and very high death-rate. Notwithstanding the small number of cases, the absence of greater variations in the death-rate for the different groups strongly suggests that the figures are probably quite accurate. A very outstanding fact is the evidence of the low virulence of the staphylococcus and non-hemolytic streptococcus infections in the treated cases. Paracentesis was done in 27 of the 44 fatal cases and repeated in several of them. A massive effusion was found in seventeen. The majority of these

cases were admitted to the hospital in such a critical condition that surgical treatment was contraindicated. In six the diagnosis was made post mortem.

All of the 18 cases that recovered without operation had encapsulated empyema of small to limited amount. Recovery took place in all but three, following a single tapping. No inference regarding the type of infection most likely to survive with repeated tappings seems justifiable. The mortality of 72.6 per cent. for the group of 62 cases without permanent drainage indicates the necessity for surgical treatment whenever possible.

The results of surgical drainage in the remaining 416 cases as given in Table VI are extremely interesting and obviously furnish a much more exact idea of the prognosis in empyema with surgical drainage than do the figures for death-rate shown in Table I. One is immediately struck with the much lower death-rate, as well as the greater uniformity in this rate, among the various types of infection. A mortality of 12.7 per cent. for all treated pneumococcus empyemas seems a very satisfactory record.

TABLE VI

DEATH RATE WITH AND WITHOUT PERMANENT DRAINAGE

Organism	Cases without Operation			Operated Cases		
	No. Cases	No. Died	Per Cent.	No. Cases	No. Died	Per Cent.
Pneu. Type 1	10	4	40.	192	19	9.8
" " 2	6	5	83.3	19	4	21.0
" " 3	3	3	100.	10	2	20.
" " 4	6	4	66.6	31	7	22.6
" Undet.	1	1	100.	7	1	14.3
Totals	26	17	65.4	259	33	12.7
Hem. Strep.	12	12	100.	76	18	23.7
Non. Hem. Strep.	2	1	50.	17	0	0.0
Staphy. Aur.	2	2	100.	23	3	13.0
Undeter.	20	12	60.	41	12	29.3
Totals	62	44	72.6	416	66	15.9

Tabulation of all operated cases with respect to the total duration of the disease and duration after operation shows that no deaths occurred after the end of the fourth week and only nineteen after the second week. It appears very definitely from these tables that the danger to life is greatest during the first week after operation, diminishes rapidly each week thereafter, and is probably negligible after the fourth. The bulk of those who were discharged "well" remained in the hospital from six to eight weeks after operation. Those discharged "relieved" spent a considerably longer time. About 60 per cent. of all cases left the hospital in 8 weeks.

SUMMARY

The principal deductions which appear to be justified by the study of 478 cases of acute empyema are as follows:

1. On the whole, the overwhelming majority of cases in a general hospital are secondary to pneumonia.

2. The organisms most commonly found in the pleural exudate in empyema are the pneumococcus, streptococcus hemolyticus, non-hemolytic streptococcus and staphylococcus aureus.

3. The bacteriology of this secondary form of acute empyema, however, is chiefly concerned with two general types, namely,—(A) empyema due to the pneumococcus, and (B) empyema due to the hemolytic streptococcus.

A. Empyema due to the pneumococcus appears after the subsidence of the intrapulmonary process, i.e., as a sequela of the pneumonia. Its course is less severe and the prognosis in general much more favorable (285 cases with case fatality rate of 17.5). The effusion is more commonly encapsulated (70 per cent.) and forms very gradually. This type of empyema is most commonly associated with the lobar form of pneumonia, although it is by no means uncommon to find pneumococcic empyema occurring with bronchopneumonia.

B. Empyema due to the hemolytic streptococcus develops coincidently with the pulmonary inflammation and in consequence runs a definitely more severe and less favorable course (88 cases with a case fatality rate of 34 per cent.). The purulent exudate may develop with extraordinary rapidity and is usually massive (75 per cent.). This type is much more commonly seen with bronchopneumonia.

4. The general incidence of the pneumococcus and hemolytic streptococcus in the entire group of empyemas is 58 and 18.4 per cent., respectively, or 76.4 per cent. if combined. Among the 417 cases with known bacteriology 89.4 per cent. were due to these two organisms. The incidence of the non-hemolytic streptococcus is 3.9 per cent., the staphylococcus 5.2 per cent., mixed infection and unknown 6.6 per cent. and pus sterile 7.9 per cent. The overwhelming importance of the pneumococcus type 1 infection is evident from the fact that it constitutes 48.4 per cent. of the total 417 cases of known bacteriology and 73 per cent. of the 277 cases of pneumococcus infection.

Types II, III and IV show a percentage incidence in the whole series of 5.2, 2.7 and 7.9 per cent., respectively, indicating an insignificant position etiologically and in this respect comparable to the staphylococcus and the non-hemolytic streptococcus.

5. The relation of the bacteriologic findings in the sputum and pleural fluid in this series of empyema is quite variable. In the case of type 1 there is an almost absolute correspondence, while in type 2 the correspondence is close but somewhat less constant. Pneumonia due to type 4 frequently shows a pleural infection with another organism, most commonly the hemolytic streptococcus.

6. The relation between age and the incidence

of empyema is an important one. One-third of all our cases occurred in children under ten years and 76 per cent. in individuals under forty.

Pneumococcus type 1 is the organism of the young, as in pneumonia. The average age of all cases of type 1 infection was nineteen. Type 3, on the other hand, is the organism of older people, the average age of all typical cases being 45 years.

Type 2 occurs in individuals of average age midway between types 1 and 3, namely, 38 years.

The type 4 series shows an average age of 28 years.

7. The seasonal trend in empyema is very variable but appears to follow quite closely that of pneumonia, the highest incidence occurring during the first few months of the year.

8. Blood cultures were made in 185 cases and found positive in one-third. In general, bacteraemia seems to be of much less prognostic significance in empyema than in pneumonia. The mortality was twice as great in the positive cases as in the negative, but even then only slightly above the death-rate for all empyemas.

There is no evidence that cases of empyema die of septicemia.

9. Complications are very common in empyema (265 in 478 cases) and are chiefly focal infections. Type 1 pneumococcus infections are especially prone to complications.

10. The death-rate with respect to the various organisms found in the empyema fluid is as follows: Pneumococcus type 1, 11.3 per cent.; type 2, 36 per cent.; type 3, 38.5 per cent.; type 4, 29.7 per cent.; all forms of pneumococci, 17.5 per cent.; hemolytic streptococcus, 34 per cent.; non-hemolytic streptococcus, 5.2 per cent.; staphylococcus, 20.7 per cent.; and finally for the total of 478 cases, 23 per cent.

The death-rate in the group of 416 cases treated by permanent drainage is as follows: pneumococcus type 1, 9.8 per cent.; pneumococcus type 2, 21.0 per cent.; type 3, 20 per cent.; type 4, 22.6 per cent.; undetermined, 14.3 per cent.; hemolytic streptococcus, 23.7 per cent.; non-hemolytic streptococcus, 0.0 per cent.; Staphylococcus aureus, 13.0 per cent., undetermined, 29.3 per cent.; and finally for the total of 416 cases, 15.9 per cent.

Age seems to play an important part in the mortality of empyema. . In infancy the death-rate is high, falling abruptly after the fifth year, but after this period, the older the age groups, the higher the death-rate. This increase in death-rate with each decade is, however, considerably less striking and constant than in pneumonia.

NOTE—Grateful acknowledgment is made of the valuable assistance in this study which has been given by the Department of Vital Statistics of the Harvard School of Public Health.

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ABNORMAL LABOR AS AN ETIOLOGICAL FACTOR IN MENTAL DEFICIENCY AND OTHER ASSOCIATED CONDITIONS: ANALYSIS OF 20,473 CASES*

BY NEIL A. DAYTON, M.D.†

THE material for the present paper was taken from the psychiatric examinations of 20,473 retarded children in the public schools of Massachusetts. The Fernald Ten-Point Scale Examination, which is a set of standardized tests, is used by all of the clinics which examine children throughout the State. This comprehensive examination covers ten different fields, giving the history and present status of each individual characteristic involved. It makes specific inquiry into the genetic, developmental, mental, physical, intellectual, social, moral and emotional status of each child examined, as well as the history of school progress and the present accomplishment in various school subjects. The cases studied were all consecutive first examinations which were made during the period 1921-1930 by the traveling psychiatric school clinics of the Walter E. Fernald State School, Wrentham State School, Boston Psychopathic Hospital, Foxborough State Hospital, Northampton State Hospital and Medfield State Hospital. By means of the traveling clinics a very complete psychiatric examination is provided for all backward school children.

The late Dr. Walter E. Fernald of the Waverley School first devised the traveling psychiatric school clinic plan and sent out the first traveling clinic from his school in 1915. In 1917, the late Dr. George L. Wallace sent out the second clinic from the Wrentham State School. As time went on, however, it soon became evident that these two clinics would not be able to examine all the backward children throughout the entire state, and the formation of additional units became imperative. Dr. Fernald placed the matter before the Commissioner of Mental Diseases, Dr. George M. Kline, and in 1921, as a result of their collaboration, new units were created to operate from each of

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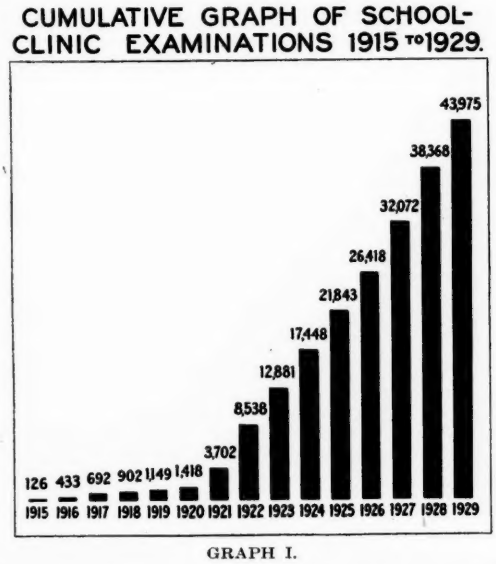
the fourteen institutions under the Department of Mental Diseases. Thus, for the first time, an adequate state-wide system of examinations was made possible.

Inasmuch as the withdrawal of a psychiatrist from the medical staffs of the various hospitals was impracticable, Dr. Kline increased the quota of each institution by one physician and one psychologist to carry on this important work. Dr. Payson Smith, Commissioner of Education, took an active part in framing the law relating to retarded children, and in outlining and enforcing the school clinic regulations which have contributed so materially to the school clinic system.

The number of examinations completed during each year has increased from 126 in 1915, to 6,242 in the year 1929. Graph I outlines the



GRAPH I.

accumulation of examinations, and shows that a total of 43,975 examinations have been conducted by the clinics during the fifteen years in which they have been in operation.

PURPOSE

The literature on mental deficiency is replete in its references to difficult labor as an etiological factor in the production of intelligence defects. Very few books or articles dealing with etiology have failed to give it a prominent place as a causative factor. It is the purpose of this communication to test the above hypothesis, using as a sample the case record material of 20,473 consecutive first examinations of retarded children in the Massachusetts public schools.

We wish to know more of the supposed etiologic relationship between difficult birth conditions and mental deficiency. In addition, we also wish to study the relationships between this factor and the present condition of the children in relation to school accomplishment, physical defects, order of birth, height, weight, diagnosis, moral reactions and personality traits.

METHOD

A visit was made to each of the institutions concerned in this study and data recorded from the Ten-Point Scale Examinations[1] established by Dr. Fernald. The facts were collected chiefly from the social histories, physical examinations, psychologic examinations, psychiatric examinations, psychiatric diagnoses, and the results of the school tests. In planning this research, definite criteria were established for the Department research workers who coded the material. The data were recorded with the aid of a special code devised particularly for this project. There were some unavoidable differences between observers which we will discuss in another communication. However, it is felt that the percentage of error due to mistakes in recording data or due to differences between recorders, is small.

In studying the relationship between abnormal labor and the various factors outlined above, we have divided our material into two intelligence groupings, 0—.69 and .70+, and have prepared tables showing the numbers and percentage distributions. Within these two groupings we have given the percentage distributions for the normal and abnormal labor groups for each sex and for the total of both sexes. By this means it became possible to compare the sexes within the same I. Q. groupings, and to compare the same sex in the different I. Q. groupings. A total for both I. Q. groups is also divided by sexes. Insofar as there were no material differences between the sexes, we have combined them in making up the graphs. This greatly simplifies the presentation, and confines the graphic demonstration to the two I. Q. groupings 0—.69 and .70+.

On the social history blank, specific questions are asked regarding the birth status of the child. We wished to record the presence or absence of abnormal conditions at birth, insofar as we hoped to measure their possible effect as evidenced in the present condition of the child. It may be well to state that we did not study only those cases recording a specific birth injury but simply the actual labor conditions in the mother. Thus the children recorded as having passed through an abnormal labor condition did not necessarily have actual evidence of injury. If we had confined our study to cases showing actual demonstrable injuries we would have excluded the possibility of injury which was not

1 The technique of these examinations was outlined in a very definite way by the annual courses for psychiatrists, psychologists and social workers which were conducted by Dr. Fernald previous to his death. These courses have since been continued by Dr. R. A. Greene, the present Superintendent of the Walter E. Fernald State School. This definite standardization of method tends to diminish the individual variation between observers.

The examinations of the cases considered in this study were made by Drs. Esther S. B. Woodward of the Walter E. Fernald State School; Alice M. Patterson of the Wrentham State School; Cornelia B. J. Schorer of the Foxborough State Hospital; Harriet W. Whitney of the Northampton State Hospital; G. Allen Troxell of the Medfield State Hospital; Marianna Taylor, Margaret A. Ribble, and Julia Deming of the Boston Psychopathic Hospital.

apparent at the time of birth but which may have had its effect later. Therefore, all abnormal labor cases are studied and not the highly selected group of birth injuries.

The information in reference to the conditions attending labor fell into three groups: prolonged labor, instrumental delivery, and unusually difficult labor. Therefore, we established any one of these three groups as a criterion for the admission of a specific case to our group "Abnormal Labor".[2] When we had determined the number of cases in the three groups which could be considered as coming under the heading "Abnormal Labor", we proceeded with the matter of investigation. Our cases were divided into four groups by sex as follows:

	Male		Female	
	I. Q.	I. Q.	I. Q.	I. Q.
Normal Labor	0-.69	.70+	0-.69	.70+
Abnormal Labor	0-.69	.70+	0-.69	.70+

The cases were divided into the above intelligence groupings so that we might have a check within our own group. We wished to see whether any of these factors occurred more consistently in the group "Mentally Defective"[3] than in the group "Not Mentally Defective". Thus, if we found that a specific condition occurred in association with abnormal labor in both the mentally defective and the not mentally defective, then it was evident that this specific factor was associated definitely with abnormal labor, irrespective of the intelligence of the child. This would be an evidence that the abnormal labor itself and not mental defect was in relationship with the result. As a matter of fact, this is what occurred in several of the different conditions studied.

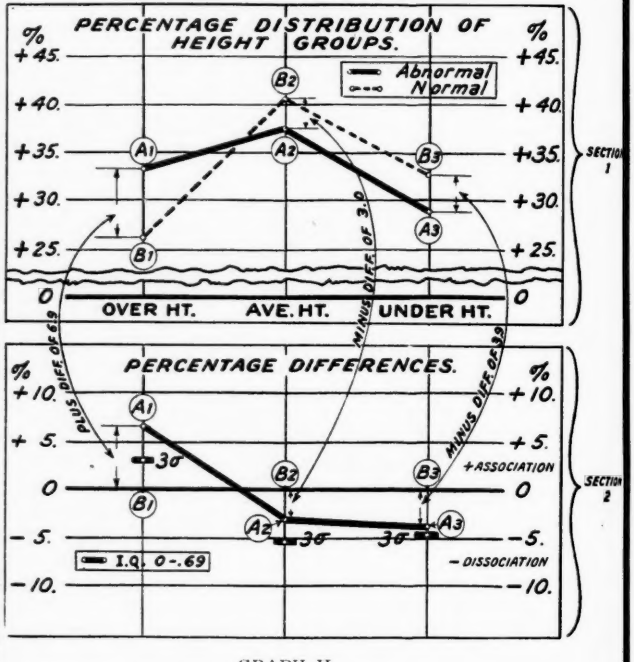
METHOD OF ANALYSIS

To test the significance of our results we have subjected the findings to statistical analysis. We will briefly outline the method adopted. For example, we will plot a sample graph in which we shall consider the relationship between normal and abnormal labor in mothers, and the present height of their mentally defective children. For the sake of simplicity, only the mentally defective group will be considered in this demonstration of method. In all following graphs, however, points are plotted for both groups "Mentally Defective" and "Not Mentally Defective". In the preliminary work on this communication all cases were divided by sex and the results kept separate in all tables. However, it was found that there were no significant differences between the sexes, and for that reason they were combined in making the graphs. These mentally defective children were then divided into three groups according to height; over-average height, average height, and under-average height. We were then ready to test the relationship between the two groups normal and abnormal labor in mothers, and the present height of their mentally defective children.

2 The criteria for the three groups are as follows:
(1) Prolonged Labor—Over 24 hours for primiparae or over 12 hours for multiparae.
(2) Instrumental Delivery—Any delivery in which instruments are used excluding low forceps. Manual operative procedures included under this heading.
(3) Difficult Labor—Unusually difficult labor or labor in which there were tears or lacerations. It should be stated that this information was obtained from the mothers themselves, or other reliable sources. Consequently, the information from the mothers was given at periods varying from 5 to 16 years after the birth of the child.

3 In this paper the term "Mentally Defective" is considered as being synonymous with the term "Feebleminded" (I. Q. 0-.69). Those with Intelligence Quotients above .70 are referred to as "Not Mentally Defective" or as "Retardates".

NORMAL AND ABNORMAL LABOR IN MOTHERS, AND PERCENTAGE DISTRIBUTION OF OVER—AVERAGE, AVERAGE, AND UNDER-AVERAGE HEIGHT GROUPS IN MENTALLY DEFECTIVE CHILDREN.



GRAPH II.

0-0 line = straight line projection of normal labor percentage distribution for both I. Q. groups.

Section 1. A1, A2, A3 represents the abnormal labor group, and gives the percentage distribution of over height, average height and under height groupings of their children at time of examination. B1, B2, B3 represents the normal labor group, and gives the percentage distribution of over height, average height and under height groupings of their children at time of examination.

Section 2. The 0-0 line represents a straight line projection of the percentages for the various factors in the normal labor distribution. The plotted points represent the excess or deficiency of the specific percentages of the abnormal labor group above or below the percentages for the same factors in the normal labor group. Thus, in Section 1 we observe the A1 is greater than B1, and this plus difference of 6.9% is transferred to Section 2 and plotted *above* the 0-0 line. We see that A2 is less than B2, and that A3 is less than B3. Therefore, these minus differences of 3.0% and 3.9% are transferred to Section 2 and plotted *below* the 0-0 line. In all graphs the plus divergencies which are plotted above the 0-0 line suggest association between the specific factor and abnormal labor. The minus divergencies which are plotted below the 0-0 line suggest dissociation. In Section 2 the rectangular markers placed in line above or below the plotted points test the statistical significance of the deviation of the specific point from the same factor in the normal labor group. The position of the marker above or below the 0-0 line represents three times the standard deviation of the difference between the two percentages for a specific factor.

Section 1 of Graph II shows the percentage distribution of present height in the children whose mothers are recorded as having experienced abnormal labor, and those whose mothers experienced normal labor. The solid line, $^{A}1$, $^{A}2$, $^{A}3$, represents the percentage distribution of the abnormal labor group. The dotted line, $^{B}1$, $^{B}2$, $^{B}3$, shows the percentage distribution of the normal labor group. The percentages for the abnormal labor group are as follows: over-average height, 33 per cent. ($^{A}1$); average height, 37 per cent. ($^{A}2$); and under-average height, 29 per cent. ($^{A}3$). When we consider the normal labor group, we see 26 per cent. over-average height represented by $^{B}1$, 41 per cent. average height in $^{B}2$, and 33 per cent. under-average height in $^{B}3$.

In comparing the percentages for the children of over-average height, we see that the abnormal labor group ($^{A}1$) exceeds the normal labor group ($^{B}1$) by 6.9 per cent. In the average height children the abnormal group ($^{A}2$) is 3.0 per cent. less than the normal labor group ($^{B}2$). In the under-average height children the abnormal labor group ($^{A}3$) is 3.9 per cent. less than the normal labor group ($^{B}3$). These comparisons are particularly interesting because a plus difference, in which the abnormal labor exceeds the normal labor, suggests an association of that particular factor (in this case over-average height) with abnormal labor. We see here a possible association between abnormal labor in the mothers at the time of birth and the factor of over-average height in the children at the time of our examination. On the other hand, there is a suggested dissociation between abnormal labor and average height and under-average height.

The question which arises at this time is as follows: Are these differences significant statistically? To show the association or dissociation in a little clearer manner, the subject matter of Section 1 has been transferred to Section 2 of Graph II. In Section 2, the normal labor percentage distribution in height factors ($^{B}1$, $^{B}2$, $^{B}3$) is projected as a straight line (0-0). If the percentage in the abnormal labor group for any particular factor *is greater* than that of the normal labor group for the same factor, the point indicating the difference is plotted *above* the 0-0 line. Thus, in the over-average height children we found that the percentage for the abnormal labor group ($^{A}1$) exceeded the percentage for the normal labor group ($^{B}1$) by 6.9 per cent. Therefore, $^{A}1$ is plotted at a point representing 6.9 per cent. *above* the 0-0 line, $^{B}1$ now being represented in the straight line projection 0-0. The percentage difference between $^{A}1$ and $^{B}1$ in Section 1 is now shown by the height of the plotted point $^{A}1$ *above* the 0-0 line. The reverse of this is shown in the $^{A}2$-$^{B}2$ situation. Here the $^{A}2$-$^{B}2$ percentage difference is plotted *below* the 0-0 line, as the abnormal labor percentage *was less* than the normal labor percentage in the average height children. Likewise the $^{A}3$-$^{B}3$ difference of 3.9 per cent. is plotted below the 0-0 line, the abnormal labor percentage for under-average height being *less* than the normal labor percentage for under-average height.

By the above means we can see at a glance whether the findings of a specific factor suggest association or dissociation with abnormal labor. Section 2 shows immediately that over-average height ($^{A}1$) is above the 0-0 line, suggesting association with abnormal labor, and that average height ($^{A}2$) and under-average height ($^{A}3$) are below the 0-0 line, suggesting dissociation. On each of the following graphs the tendency toward association or dissociation may be determined readily by noting whether the plotted point for a specific factor is above or below the 0-0 line. It remains, however, to test the significance of these differences.

We may ask whether the observed differences may not have occurred simply by chance. To answer this, we have computed the standard deviation of the difference[4] between the percentages for a specific factor in both the abnormal and normal labor groups. Once computed, we have multiplied the resulting standard deviation by three to give us a three sigma test of significance. On the graphs a small black bar has been placed above or below a plotted point to indicate three times the standard deviation of the difference, which is represented by the plotted point. This bar is followed by the sign $3\sigma^{-}$. The position of this bar marker in relation to the plotted point indicates whether the observed difference between the normal and abnormal labor groups is significant statistically. If the marker is further from the 0-0 line than the plotted point it indicates that the difference is not equal to three times the standard deviation of the difference, and consequently *is not significant statistically.* However, if the marker is closer to the 0-0 line than the plotted point, it indicates that the difference is more than equal to three times the standard deviation of the difference, and therefore *is significant statistically.* If the plotted point is further from the 0-0 line than the marker we know at once that we are viewing a statistically significant difference demonstrating an association or dissociation. When this condition exists above the 0-0 line it demonstrates association between abnormal labor and the specific factor. Whenever the same condition is seen below the 0-0 line

4 The formula for the standard deviation of the difference between two percentages is as follows:

$$S.D._{P_1-P_2} = \sqrt{\left(\frac{P_1}{\sqrt{C_1}}\sqrt{1-P_1}\right)^2 + \left(\frac{P_2}{\sqrt{C_2}}\sqrt{1-P_2}\right)^2}$$

where p1 = percentage of cases in the normal labor group with specific trait "A";
p2 = percentage of cases in the abnormal labor group with specific trait "A";
c1 = number of cases in the normal labor group with specific trait "A";
c2 = number of cases in the abnormal labor group with specific trait "A".

we are viewing dissociation. In Section 2 of Graph II we see that point A-1 is much higher than the bar indicating $3\sigma^-$, and that points A-2 and A-3 are well within the $3\sigma^-$ criterion. Thus the present condition of over-average height in the child is significantly associated with the condition of abnormal labor in the mother. (This point will be discussed in another section as the present outline is being used simply as a demonstration of method.) In the groups average height and under-average height, we see a suggestion of dissociation with abnormal labor which is not significant statistically.

In reading the graphs, it is necessary to remember that the 0-0 line is a straight line projection of the normal labor distribution, whatever the specific factor studied may be. Positive differences suggesting association, in which the abnormal labor group percentage exceeds the normal labor group percentage, are plotted above this line. Negative differences, suggesting dissociation, in which the abnormal labor percentage is less than the normal labor percentage, are plotted below this line. The 3 sigma marker tests show the chance variation of these differences, and indicate whether the difference observed is to be considered as coming within the realms of chance variation. In the example we saw that the percentage difference in the factor of over-average height was far above chance variation. The point as observed is over 5 sigma. If we recall that 5 sigma would indicate an event occurring by chance approximately once in a million times, we can see the remote possibility for this particular event occurring by accident.

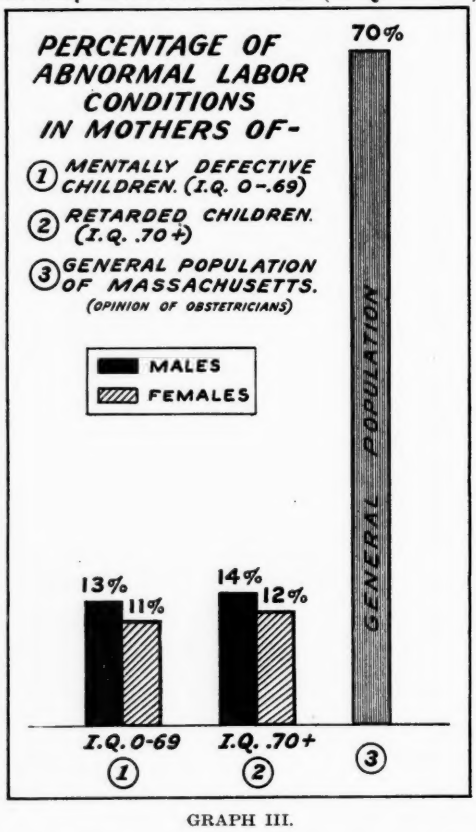
The method as outlined above is used uniformly in all the graphs following, with the exception of Graphs III, V and VI.

THE INCIDENCE OF ABNORMAL LABOR

With the thought of making a comparison between the incidence of abnormal labor in mothers in the general population and mothers of mentally defective or retarded children, we determined to study the present situation in reference to abnormal labor in mothers in the population at large. A survey of the literature showed widely differing results for different sections of the country, and for different social and economic levels. We determined therefore to confine our comparison to the Massachusetts population. Questionnaires were sent to 125 Massachusetts physicians reported as specializing in obstetrics in accordance with the Medical Directory of the American Medical Association. We asked these physicians what percentage of births would be considered as coming in each of the three categories: prolonged labor, instrumental labor, or difficult labor in accordance with the established criteria. We asked specifically that the replies should consider birth conditions as a whole, and not the results of hospital deliveries.

In the opinion of these obstetricians, the percentage of present-day deliveries which would come under the heading of abnormal labor would average 70 per cent. As the opinions of these obstetricians were based on their own practices the resulting average figure is undoubtedly high, due to the selection of difficult cases. We must also consider the tendency of obstetricians to insist upon the hospitalization of cases referred to them. This hospitalization of maternity work renders easily available facilities for instrumental delivery which are lacking in extra-hospital practice. There is also the factor of time. The children of the mentally defective and retarded groups which we are considering were born from 5 to 16 years ago. The obstetricians were reporting the status of their practices at the present time. We know that there has been a decided tendency for the hospitalization of maternity work. In all probability, this has increased definitely over the past ten years. At the same time, it does appear that any of these differences, or all of them in combination, would account for the marked divergence between 70 per cent. and the percentages observed in the following paragraph.

In comparing the labor condition in mothers of mentally defective children (I. Q. 0—.69) we

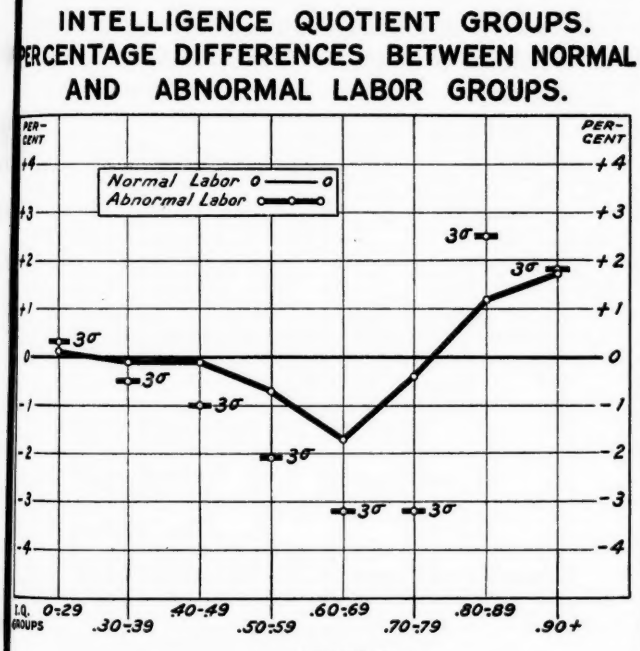


GRAPH III.

see in Graph III that the percentage considered as falling in the abnormal labor group is 13 per cent. for male births and 11 per cent. for female births. When the child is retarded (I. Q.

.70+) the percentage for the male births is 14 per cent. and 12 per cent. for the female births. It is interesting to observe that the percentage of abnormal labor in mothers is higher in the .70+ group than in the 0—.69 group. That is, there seem to be more birth difficulties in the mothers of retarded children than in the mothers of mentally defective children. There is a sex difference here also, in that abnormal labor in mothers of boys showed a consistent 2 per cent. excess as compared with the mothers of girls.

In discussing these results, we see that there is little evidence that abnormal birth conditions occur in mothers of mental defectives or retardates to a greater extent than they do in the general population of the State. However, our comparison is not extremely accurate, owing to the factor of personal opinion in the population sample. However, we can at least make one definite statement from this comparison. There does not seem to be any evidence that abnormal labor is any more characteristic of the birth conditions of mothers of mental defectives or retardates, than is observed in the Massachusetts population at large. If anything, there seems a suggestion here that the mothers of these mentally defective or retarded children are having fewer birth difficulties than other groups not mentally defective or retarded.



GRAPH IV.

To simplify the graphic demonstration of the difference between the percentage distributions of the normal and abnormal labor groups, we represent the percentage distribution of normal labor by a straight line projection in the 0-0 line. We then show the divergence of the percentage for a specific I. Q. group in the abnormal labor group from the corresponding percentage for the same I. Q. group in the normal labor group by plotting the percentage difference above or below the 0-0 line. This enables us to show that proportionately the specific I. Q. group in the abnormal labor group existed to a greater (above the line) or lesser (below the line) degree than in the normal labor group. Points above the 0-0 line show a positive difference, thus suggesting an association of the particular trait with abnormal labor. Points below the 0-0 line suggest dissociation. The association (shown by a plus difference) or dissociation (shown by a minus difference) is then tested for significance by the standard deviation of the difference. An indicator representing three times the standard deviation of the difference has been placed directly above or below the plotted point for each trait. The solid line represents the divergence of the plotted points for the abnormal labor from those of normal labor for the I. Q. group 0—.69; in the same manner the shaded line represents the I. Q. group .70+.

These details apply to all following graphs and are not repeated in complete form.

ABNORMAL LABOR AND INTELLIGENCE

In Graph IV we demonstrate our findings in reference to the relationship between abnormal labor in mothers and the present intelligence quotient of their children. Graph IV presents the findings in accordance with the method previously outlined under the heading "Method of Analysis", and shows that there is apparently no association between abnormal labor in mothers and the present intelligence of their children in the I. Q. groups .30—.39, .40—.49, .50—.59, .60—.69, .70—.79. The plotted points for the groups 0—.29, .80—.89 and .90+ are well above the 0-0 line, and show that these groups are the only ones apparently associated with abnormal labor. Recalling our 3 sigma test for significance, we see that the only figure meeting this criterion is the plotted point for the .90+ group.

These results are extremely interesting. We see that abnormal labor appears to be associated with the low and high grade cases, but not with the intermediate groups. It should be noted that the suggested association between abnormal labor and the three I. Q. groups 0—.29, .80—.89, and .90+ is the least definite for the I. Q. group 0—.29. According to our experience and accepted opinions, we would expect to see a definite association between abnormal labor and the low grade cases rather than with the higher grade cases. However, in this group we observe only a suggestion of association which is not significant statistically. The number of cases in this sample with intelligence quotients below .30 is rather small, and for that reason the results are not as reliable as in the other groups.

The results for intelligence quotients between .30 and .79 seem fairly conclusive in a negative way. However, the positive findings in reference to the higher intelligence quotient groupings open up endless realms of hypothesis. It seems that abnormal labor in mothers has little association with the intermediate I. Q. groupings. The results suggest that the condition here seems to be a fairly definite one and not subject to external influences such as accidents of birth. In the very low or very high I. Q. groups, accidents surrounding birth tend to have more effect. Thus, abnormal labor conditions may affect the very low or the very high grade cases; that is, the idiot group or the dull normal and normal groups. It might be well to say that the .90+ group includes all cases with intelligence quotients over .90. How-

ever, the cases in the group .90—.99 make up 74 per cent. of the total. It appears that children of dull normal or low normal intelligence are more likely to be influenced by abnormal birth conditions than children who are definitely in the imbecile, moron or borderline groups.

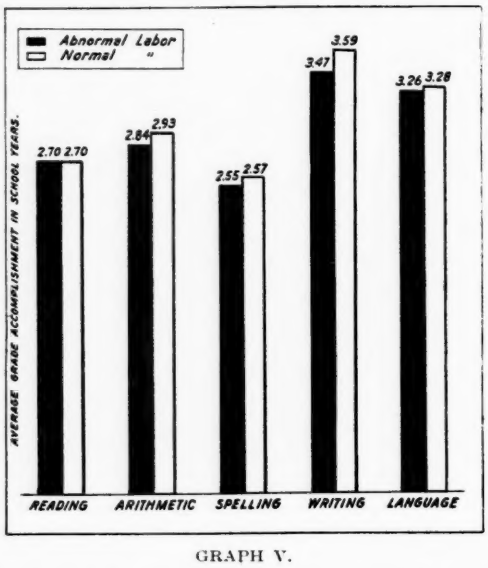
The finding in reference to the higher grade cases is, in itself, of tremendous significance, and warrants a redoubling of efforts to minimize the dangers of birth trauma. It may be surprising that there is so little relationship between abnormal labor and the present mental condition of the children of the intermediate mental grades. This is of little significance, however, in comparison with the finding that it is associated with the more intelligent of these retarded children. If we consider the matter in its broader aspects, we see immediately that the actual numbers of mental defectives in the population are infinitesimal in comparison with the numbers in the I. Q. groups .80—.89 or over .90. This factor must be emphasized as of far-reaching significance owing to the tremendous numbers involved.

If we except the idiot group, the findings would suggest to us that the cerebral structure of the mental defective is not in a state of instability and, therefore, easily influenced by birth trauma, as previously supposed. On the contrary, the results suggest that the groups with intelligence quotients between .30 and .79 possess an unexpected degree of structural stability which enables them to withstand the trauma of birth injury much better than very low or very high grade cases. That is, the conditions of imbecility or moronity tend to be unaffected by an abnormal birth process, while more intelligent children tend to be affected in a greater degree by the same birth difficulties. In other words, if abnormal labor conditions are to be considered as etiologic factors in the production of deviations from the normal intelligence, they exert their greatest influence on the low grade case, the idiot, or on the high grade case, the dull normal and low normal cases.

ABNORMAL LABOR AND AVERAGE GRADE ACCOMPLISHMENT

In view of the many criticisms directed toward the intelligence quotient, we determined to add a test of a little different type. School clinic psychiatrists have often commented upon the tremendous differences observed in school accomplishment of children with the same intelligence quotient. In view of these apparent inconsistencies it appeared advisable to apply a different criterion in testing the intellectual status of the children of this sample. Thus, we determined to test the possible relationship between abnormal labor conditions in mothers and the present average grade accomplishment of their children in various school subjects. Again, to overcome the difficulty of mixed classification in intelligence quotient, we continued the division of the two intelligence groupings 0.—69 and .70+. That is, in studying this particular point, we took the mothers who experienced abnormal labor, and calculated the average school accomplishment of their children. In reading, we found the average for the entire group with I. Q. 0—.69 to be 2.70 school years. That is, the average of this group in reading corresponded to completion of the second grade and seventy hundredths of third grade work. We then calculated the average school accomplishment in reading for the group in which the mothers experienced a normal labor. We found in this particular group that the average grade accomplishment in reading was also 2.70 school years.

NORMAL AND ABNORMAL LABOR IN MOTHERS OF MENTAL DEFECTIVES AND PRESENT AVERAGE GRADE ACCOMPLISHMENT OF THEIR CHILDREN IN VARIOUS SCHOOL SUBJECTS.



GRAPH V.

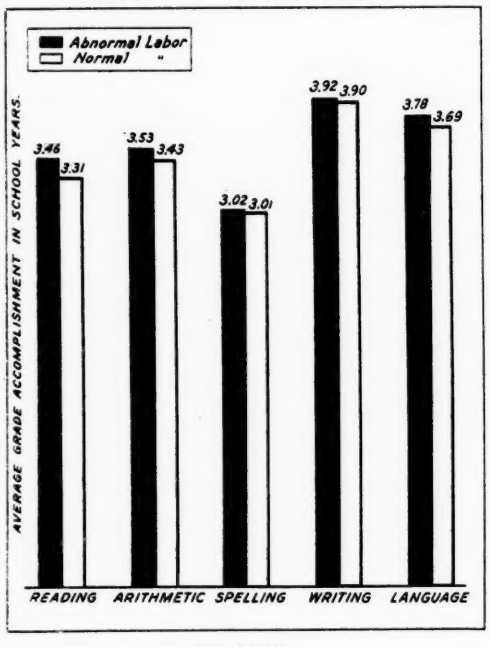
In Graph V we see the average grade accomplishment[5] in the school subjects, reading, arithmetic, spelling, writing and language, for the two groups abnormal labor and normal labor. In this particular graph we consider only mentally defective children, or those with intelligence quotients 0.—.69. Here, for the sake of brevity, we have departed from our original plan as outlined under the heading "Method". If we applied our previous method to this particular point, a graph and table would be necessary for each school subject. We have presented the matter in a condensed form which is adequate for all practical purposes, although not satisfactory from the viewpoint of statistical analysis.

In Graph V we see very small differences in school accomplishment between the two groups abnormal labor and normal labor. The greatest

5 The accomplishment in various school subjects is tested by the "School Tests", which make up one part of the Fernald Ten-Point Scale Examination.

difference, in writing, is twelve hundredths of a school year. This difference between averages, however, is only about thirty-two days of a school year, and is not sufficiently large to justify further discussion. The differences for the other subjects are very much smaller, while in reading there is no difference. In this group of mental defectives, then, we can say that there appears to be no association between abnormal labor in mothers and the average school accomplishment of their children in various school subjects.

NORMAL AND ABNORMAL LABOR IN MOTHERS OF RETARDATES, AND PRESENT AVERAGE GRADE ACCOMPLISHMENT OF THEIR CHILDREN IN VARIOUS SCHOOL SUBJECTS.



GRAPH VI.

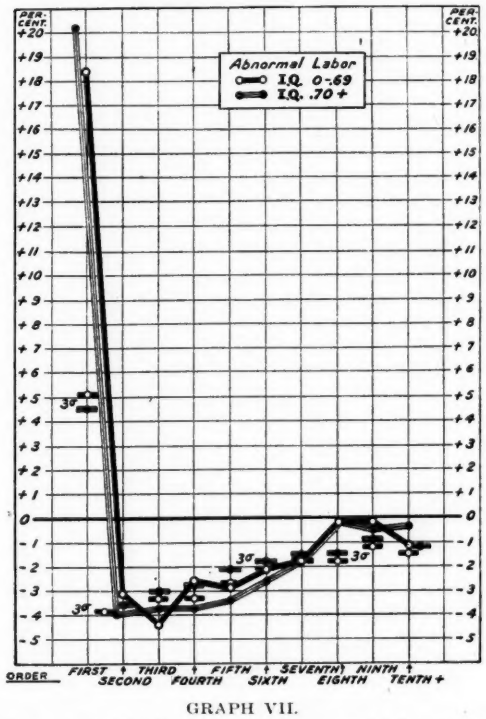
Graph VI outlines the average grade accomplishment of the I. Q. group .70+. This material also presents slight differences with the exception that in this group the children of mothers experiencing abnormal labor appear to do a little better in school work than the group normal labor. However, here again the differences for a specific subject are so small that they do not merit further discussion. The greatest difference in this group is in reading, that of fifteen hundredths of a school year, or about forty days. This difference is comparatively small, and the differences in other subjects are even smaller. We may say also that in the I. Q. group .70+ there is no indication that abnormal labor in mothers shows a significant association with the present school accomplishment of their children in the various school subjects.

ABNORMAL LABOR AND ORDER OF BIRTH

In previous sections we have discussed the relationship between abnormal labor and the field of intelligence. We will now turn to the physical aspect of the problem and discuss several points having to do with the physique and physical anomalies which were observed in these children at the time of examination. It may be that abnormal labor does not have its principal effect in the field of the intelligence, but may show positive findings in the physical field.

We will first consider the order of birth of these children, although this particular item serves as a better check of the physiology of birth than of any possible relationship with physical defect. At the same time it will serve to show us whether there is any indication that abnormal labor or any particular birth order is more characteristic of the mental defectives than of the group not mentally defective. Graph VII gives us the result of this particular phase of the study.

ORDER OF BIRTH.
PERCENTAGE DIFFERENCES BETWEEN NORMAL AND ABNORMAL LABOR GROUPS.



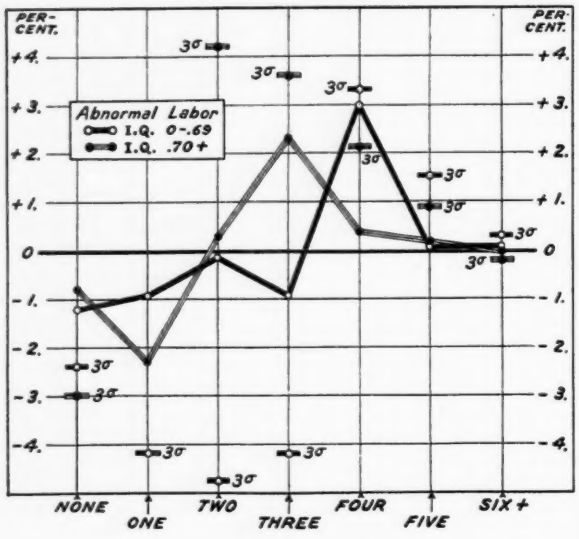
GRAPH VII.

0-0 line = straight line projection of normal labor percentage for both I. Q. groups. Solid line represents I. Q. group 0—.69. A plotted point of the solid line represents the difference between the percentage for a specific trait in the normal labor group and the percentage for the same trait in the abnormal labor group in the I. Q. group 0—.69. The shaded line gives the same presentation for the I. Q. group .70+. The indicator representing three sigma serves as a test of the statistical significance of the specific difference.

Graph VII shows that abnormal labor has a definitely significant association with the first birth, and a significant dissociation with all following births. This is an expected result, according to the commonly understood conceptions of the normal physiology of birth. That is, we expect difficult births to occur in primiparae.

In both of the I. Q. groups 0—.69 and .70+ we see that the first birth in the abnormal group greatly exceeds the percentage accorded the first birth in the normal group. The results in both groups so far exceed the test of statistical significance that there can be no question whatsoever of the association between abnormal labor and the first birth. However, this material requires considerable interpretation before it can be applied to our particular field. This segregation of the abnormal labors in connection with the first birth would be of tremendous significance in our particular problem if there were any great difference between the two I. Q. groups 0.—.69 and .70+. However, this is not the case. On the contrary, we see that the I. Q.

PHYSICAL DEFECTS BY NUMBER. PERCENTAGE DIFFERENCES BETWEEN NORMAL AND ABNORMAL LABOR GROUPS.



GRAPH VIII.

0-0 line = straight line projection of normal labor percentage for both I. Q. groups. Solid line represents I. Q. group 0—.69. A plotted point of the solid line represents the difference between the percentage for a specific trait in the normal labor group and the percentage for the same trait in the abnormal labor group in the I. Q. group 0—.69. The shaded line gives the same presentation for the I. Q. group .70+. The indicator representing three sigma serves as a test of the statistical significance of the specific difference.

group .70+ slightly exceeds the difference accorded the I. Q. group 0—.69. That is, abnormal labor and the first birth tend to be associated with the higher intelligence quotients to a greater degree than with the lower I. Q. groupings. If mental deficiency only were associated with the condition of abnormal labor in the first birth, we would expect to see the situation reversed. That is, the relationship of low intelligence, abnormal labor and first birth should greatly exceed the same situation in the higher I. Q. groupings. As this is not the case, we are not justified in drawing any conclusions from this particular phase of the material. If anything, it tends to identify abnormal labor in the first birth with the higher I. Q. groupings, and not with the so-called mental defectives.

It should be made clear that the findings associating abnormal labor with the first birth should not be interpreted as implying a connection between mental defect or retardation and the first birth. In a previous communication[6] it was shown that the birth order of mental defectives and retardates shows no disturbance from the expectation. The results of this study simply confirm the expected relationship between abnormal labor and the first birth, and do not link abnormal labor and the first birth with mental defect.

ABNORMAL BIRTH AND NUMBER OF PHYSICAL DEFECTS

We now wish to consider the possible relationship between abnormal labor in the mother and the number of physical defects observed in the child. That is, we wish to see whether there is any indication that an abnormal birth process is associated with the number of physical defects observed in the child at the time of our examination. This material is outlined in Graph VIII.

If we first consider the I. Q. group 0—.69, we see that the differences are minus, indicating dissociation, until we reach the number of four physical defects. Here our plotted point approaches the three sigma marker of significance, but is within it. The plotted points for five and six defects are well within the test of significance. So, in this group there does not seem to be any consistent association. If the plotted points for five and six defects were also significant or nearly significant, we could say that there was an indication here that the larger number of physical defects tended to be associated with abnormal labor in mothers. However, the fact that the plotted point for four physical defects is the only one approaching significance makes us wonder whether this may have been simply an accident or, in other words, due to chance variation.

When we survey the I. Q. group .70+ we see that the plotted points for two, three, four and five defects are above the 0-0 line. While this position suggests association, it is observed that these points are also far distant from the three sigma markers for significance. The results in both of these intelligence groupings appear to be well within the limits of chance variation. However, we observe that the smaller numbers of physical defects for both I. Q. groups are below the 0-0 line (dissociation), and the larger number of defects, four or more, are above the 0-0 line (association). We view here a tendency for abnormal labor to be associated with the larger number of physical defects, although the results are not significant statistically.

6 Dayton, N. A.: Order of Birth of Mental Defectives. Journal of Heredity, 20: 219-224, May, 1929.

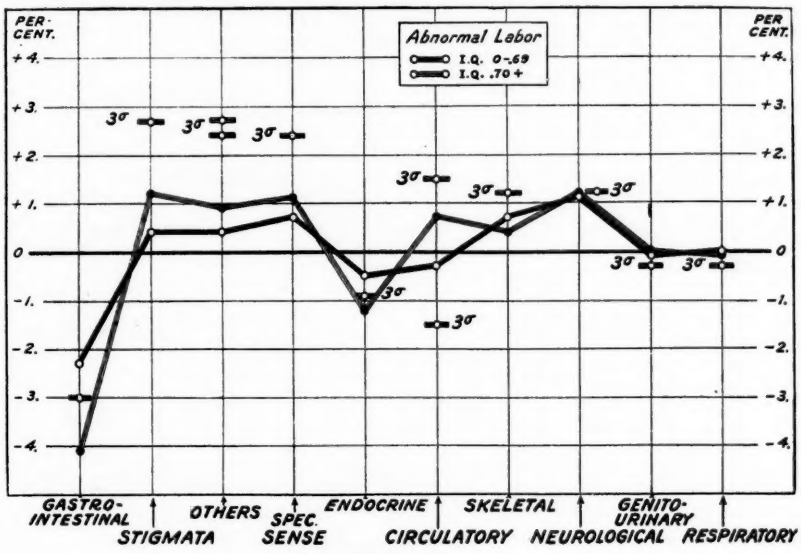
ABNORMAL LABOR AND SPECIFIC PHYSICAL DEFECTS

Under the previous heading we discussed the association between abnormal labor in mothers and the number of physical defects. While these results were for the most part negative, there remains a further analysis to be made. It is perfectly possible that there may be little relationship between abnormal labor and the *number* of defects, and still there may remain a significant relationship between abnormal labor and a *particular type* of defect. We determined, therefore, to investigate the possibility of an etiologic relationship between abnormal labor and defects of a specific type. In recording the results of our physical examinations, we condensed the findings and listed them under separate systems. The groupings are as follows: gastro-intestinal (includes abnormal tonsils, teeth and adenoids), stigmata, special sense (defective vision, hearing and extreme speech defect), endocrine, circulatory, skeletal, neurologic, genito-urinary and respiratory systems. In Graph IX we see the results of this analysis. In considering the I. Q. group 0—.69 we see that there is little relationship between abnormal labor and stigmata, disorders of vision or hearing, and defects of the gastro-intestinal, endocrine, circulatory, genito-urinary or respiratory systems. In reference to skeletal defects, we see that the plotted point approaches the three sigma test of significance, but is within it. However, the plotted point for neurological defect equals the three sigma marker, and thus comes within the test of significance. Thus, in considering the possibility of abnormal labor being associated with the development of specific defects in the mentally defective group, we see that there is a suggestion that it is connected with skeletal defect, and we see also that it is definitely associated with neurological defect.

In considering the I. Q. group .70+ we see essentially the same situation. It appears here that there is no association with stigmata, disorders of special sense, and defects of the gastro-intestinal, endocrine, circulatory, skeletal, genito-urinary or respiratory systems. Again we see the same significant association with neurological defect, and also a suggestion of association with circulatory defect. However, the only one of this group which we can say is definitely positive is a defect of the neurological system. It is interesting to observe that the trend for both intelligence groups follows each other closely with the exception of circulatory defect which shows a tendency to association in the .70+ group and dissociation in the 0—.69 group.

We may say that the findings under this particular heading are a little more definite than those based upon number of defects only. The only significant association for both I. Q. groups is between abnormal labor and defects or dis-

PHYSICAL DEFECTS BY NAME.
PERCENTAGE DIFFERENCES BETWEEN NORMAL AND ABNORMAL LABOR GROUPS.



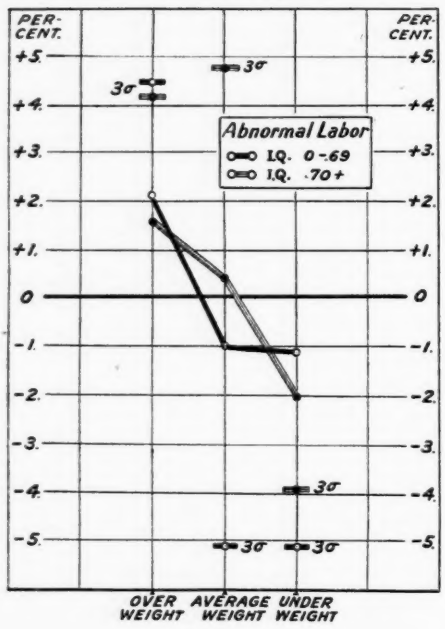
GRAPH IX.

0-0 line = straight line projection of normal labor percentage for both I. Q. groups. Solid line represents I. Q. group 0—.69. A plotted point of the solid line represents the difference between the percentage for a specific trait in the normal labor group and the percentage for the same trait in the abnormal labor group in the I. Q. group 0—.69. The shaded line gives the same presentation for the I. Q. group .70+. The indicator representing three sigma serves as a test of the statistical significance of the specific difference.

eases of the neurological system. In the I. Q. group 0—.69 we see a suggestion of association with diseases or defects of the skeletal system and for the I. Q. group .70+ a suggestion of association with diseases or defects of the circulatory system.

ABNORMAL LABOR AND WEIGHT

In discussing abnormal labor in mothers and the present weight condition of the children, we wish to inquire into the possibility of abnormal labor being associated with a persisting nutritional disturbance in the child, as demonstrated in his present weight[7]. The results are shown in Graph X. Both I. Q. groups are practically the same and do not require individual discussion. We see in both groups that there is a tendency for association between abnormal labor and present over-weight. The average weight groups are neutral, while the underweight groups appear to show a tendency to



GRAPH X.

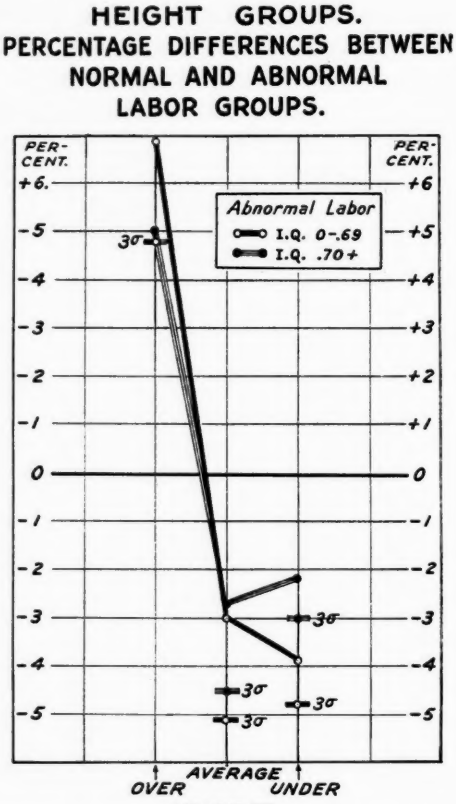
0-0 line = straight line projection of normal labor percentage for both I. Q. groups. Solid line represents I. Q. group 0—.69. A plotted point of the solid line represents the difference between the percentage for a specific trait in the normal labor group and the percentage for the same trait in the abnormal labor group in the I. Q. group 0—.69. The shaded line gives the same presentation for the I. Q. group .70+. The indicator representing three sigma serves as a test of the statistical significance of the specific difference.

7 These weights were based on height, age and sex according to the Baldwin-Wood Tables for average children. We have made an arbitrary allowance of ten per cent. above and below the mean weights for the various age-height groups, and have considered this as the average group. Preliminary investigation showed that this allowance was justified statistically. Therefore, the average group consists of a twenty per cent. variation about the mean for a particular age-height group. Weights above or below the limits of the average group are, therefore, above or below average weight.

dissociation. If we were hoping for a result which would connect abnormal labor and present under-weight in children, we have met here with a distinct disappointment. It appears that, if anything, abnormal labor in mothers tends to be associated with present over-weight in the child. However, it must be recalled that all of these plotted points are well within the three sigma test for significance, and, therefore, need not be discussed at any great length.

ABNORMAL LABOR AND HEIGHT

In continuing our discussion of nutritional disturbances, we wish also to determine whether there is any association between abnormal labor in mothers and the present height[8] of their children. The results in this particular field are outlined in Graph XI. Here also both I. Q. groups are so nearly parallel that they can be discussed together. We see a definite association between abnormal labor in mothers



GRAPH XI.

0-0 line = straight line projection of normal labor percentage for both I. Q. groups. Solid line represents I. Q. group 0—.69. A plotted point of the solid line represents the difference between the percentage for a specific trait in the normal labor group and the percentage for the same trait in the abnormal labor group in the I. Q. group 0—.69. The shaded line gives the same presentation for the I. Q. group .70+. The indicator representing three sigma serves as a test of the statistical significance of the specific difference.

8 These height groups were based on age and sex according to the Whipple Table for average children. We have made an arbitrary allowance of three per cent. above and below the mean height for the various ages, and have considered these as the average group. Preliminary investigation showed that this allowance was justified statistically. Therefore, the average group consists of a six per cent. variation about the mean for a particular age. Heights above or below the limits of the average group are, therefore, above or below average height.

and over-average height in their children. There is a suggestion of dissociation in the groups average height and under-average height. Again, we see a reversed result in the possibility of abnormal labor being the cause of skeletal under-development. On the contrary, we see a statistically significant association between abnormal labor and present over-height of the children. The explanation of this is somewhat difficult, as there appears to be no relationship whatsoever between abnormal labor and over-average height. In discarding the possibility of abnormal labor as a cause of an interruption of or an interference with the normal growth process, we may turn to another possibility. It is suggested that children over-height at the present time may have been the larger infants at the time of birth. It is, therefore, not unreasonable to believe that this condition of over-average height or the condition of over-average weight may have been associated with labor difficulties at the time of birth of the child. To reverse this reasoning, we may suggest that the over-age height and over-average weight of these children which existed at birth and which was the cause of the difficult birth have persisted as characteristics, and we find that the over-average infant is now the over-average child. While it is a little apart from the subject under discussion we may say that this finding lends support to the theory of the persistence of body type irrespective of the environment.

In both fields of weight and height, which test the possibility of a relationship between abnormal labor and permanent nutritional disturbances, such as the condition of under-average weight or under-average height, we see definitely negative findings.

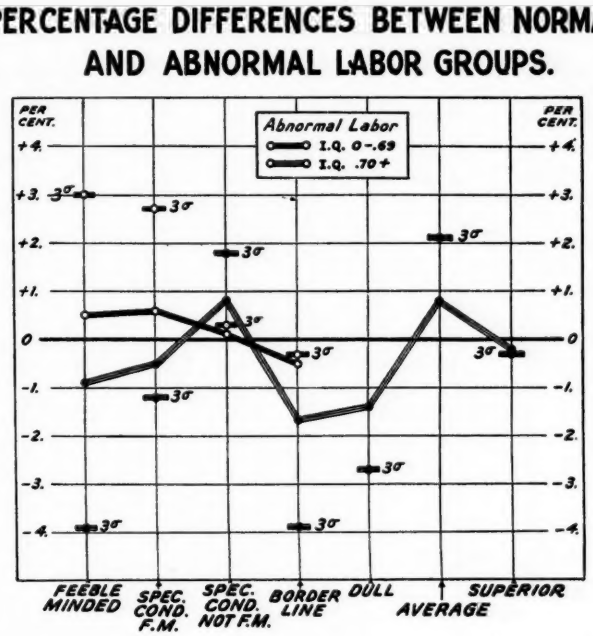
ABNORMAL LABOR AND DIAGNOSTIC GROUPS

In the first part of the paper we discussed the relationship between abnormal labor and intelligence of the child, as tested by the I. Q. We wish in this section to study the possibility of relationship between abnormal labor and the various clinical classifications, as outlined in Graph XII. That is, we wish to know whether there is any relationship between abnormal labor and specific conditions such as microcephalus, mongolism, cretinism, etc. To simplify the work we have divided these groups as follows: (1) Mentally Defective, (2) Special conditions also mentally defective[9], (3) Special conditions not mentally defective[10], (4) Borderline, (5) Dull, (6) Average, (7) Superior.

9 All of these cases are mentally defective plus one of the following special conditions: Hydrocephalus, Microcephalus, Mongolism, Cretinism, Epilepsy, Neurological disease, Encephalitis, Defective Delinquent, Psychosis or Psychoneurosis, Indefinite Endocrine Imbalance, Lues.

10 All of these cases are not mentally defective but include one of the following special conditions: Epilepsy, Psychosis or Psychoneurosis, Indefinite Endocrine Imbalance, Constitutional Psychopathic Inferiority, Neurological disease, Delinquent.

We wish specifically to see in this demonstration whether there is any suggestion that abnormal labor may be associated with these special conditions, as enumerated, irrespective of the intelligence. It might be possible, for instance, that abnormal labor is not associated with intelligence in itself, and yet show association with the various clinical groupings. In considering the group 0—.69, we see in Graph



GRAPH XII.

0-0 line = straight line projection of normal labor percentage for both I. Q. groups. Solid line represents I. Q. group 0—.69. A plotted point of the solid line represents the difference between the percentage for a specific trait in the normal labor group and the percentage for the same trait in the abnormal labor group in the I. Q. group 0—.69. The shaded line gives the same presentation for the I. Q. group .70+. The indicator representing three sigma serves as a test of the statistical significance of the specific difference.

XII that the plotted points for those mentally defective and those with special conditions plus mental defect and special conditions without mental defect are above the 0-0 line. The association, however, is weak, and is not sufficiently close to the three sigma markers of significance to suggest association.

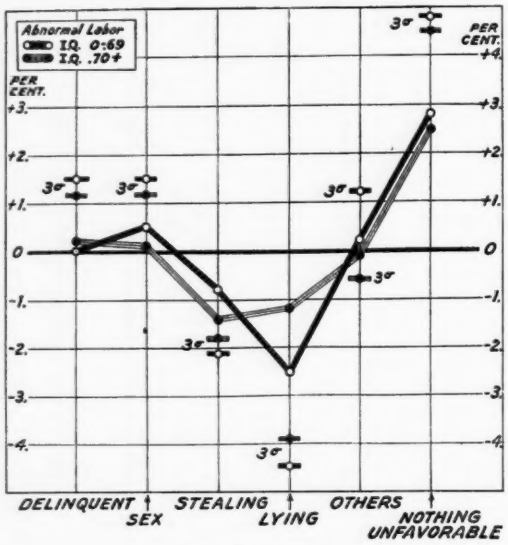
In considering the I. Q. group .70+, the only point here approaching significance is that of the special conditions without mental defect, and this also is well within the designated test of significance. In general, we may say that from this analysis there is no indication that abnormal labor is in any closer association with any of these clinical groups than with the intelligence classifications. There is a possibility, of course, that some one of these special conditions may show more conclusive results. However, the findings for all conditions grouped are so far from being significant that we are justified in questioning this. Considering both I. Q. groups and all diagnoses, we may say that there

is no indication of any association between abnormal labor in mothers and the combinations of diagnostic groups in which their children were placed.

ABNORMAL LABOR AND SOCIAL CONDUCT

In previous sections we have covered the relationship between abnormal labor and mental status, and also physical status. We now wish to proceed further and discuss this point in relation to conduct and personality. One section of the school clinic examinations contains a form for recording various factors under the heading of "Moral Reactions". In this particular phase of the examination the social conduct of the child is gone into in relation to delinquency, stealing, lying, sex offenses, and other deviations from average or normal conduct. Is there a possibility that the trauma of birth may have produced changes which exhibit themselves in conduct disturbances in later life?

SOCIAL CONDUCT.
PERCENTAGE DIFFERENCES BETWEEN NORMAL AND ABNORMAL LABOR GROUPS.



GRAPH XIII.

0-0 line = straight line projection of normal labor percentage for both I. Q. groups. Solid line represents I. Q. group 0—.69. A plotted point of the solid line represents the difference between the percentage for a specific trait in the normal labor group and the percentage for the same trait in the abnormal labor group in the I. Q. group 0—.69. The shaded line gives the same presentation for the I. Q. group .70+. The indicator representing three sigma serves as a test of the statistical significance of the specific difference.

This material is outlined in Graph XIII. In the I. Q. group 0—.69 we see that the only factors suggesting association with abnormal labor are the groups "Sex Offenses" and "Nothing Unfavorable". However, the tendency to association in sex offenses is weak, and does not approach the test of significance sufficiently to warrant discussion. In discussing the relationship of abnormal labor in mothers and the social conduct of their children in the group considered mentally defective, we see that there is no factor which appears to show significant association.

In considering the I. Q. group .70+ we see that the curve has essentially the same characteristics, and that none of these factors appear to be associated with abnormal labor in mothers. The suggested association between abnormal labor and "Sex Offenses" is not so high in this group as it is in the group mentally defective. In this graph also it is interesting to observe that the curves for both I. Q. groups tend to coincide. However, the results in all factors are so definitely removed from significance that we are justified in saying there is no indication of an association between abnormal labor in mothers and any of these factors of social conduct which were observed in their children.

ABNORMAL LABOR AND PERSONALITY TRAITS

We wish to go further in the foregoing analysis in reference to social conduct, and turn now to the possible relationship between abnormal labor in mothers and the various personality traits observed in their children. We wish particularly to ascertain whether there is any relationship between abnormal labor in mothers and their children's deviations from normal, particularly in the emotional field. We see this material outlined in Graph XIV.

In considering the I. Q. group 0—.69, we see quite unexpected results. We see that the plotted points for the groups "Seclusive", "Egotistical", and "Over-affectionate" closely approach the 3 sigma test of significance, and strongly suggest an association between abnormal labor and these factors. We find the plotted point for the group "Emotionally Unstable" definitely exceeds the 3 sigma test of significance, and is unquestionably associated with abnormal labor. We also observed that the personality groups "Obedient" and "Social" show a statistically significant dissociation with abnormal labor. That is, the association here is away from the condition of abnormal labor, and is significantly linked with the normal labor group. This relationship is extremely interesting as it shows a tendency for these two groups to avoid the abnormal labor group. The plotted points are definitely beyond the 3 sigma markers of significance, and show an undeniable dissociation between these factors and abnormal labor.

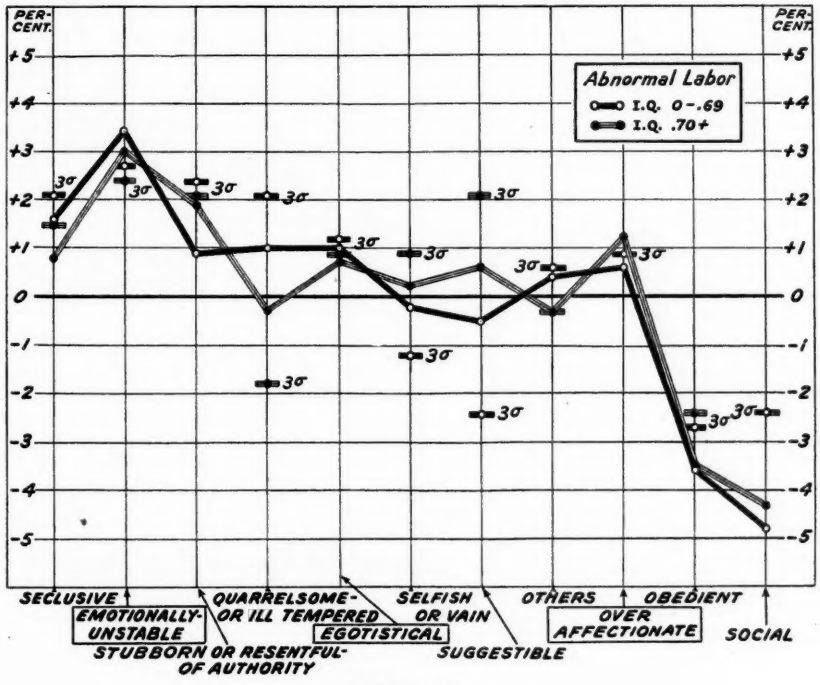
In considering the I. Q. group .70+ we see that the personality groups "Seclusive", "Stubborn", and "Egotistical" are near the 3 sigma test of chance variation, and suggest association between these factors and abnormal labor. We also observe that the personality groups "Emotionally Unstable" and "Over-affectionate" definitely exceed this same statistical criterion, and show a significant association between abnormal labor and these factors. We see the same situation as in the I. Q. group 0—.69 in reference to the personality groups "Obedient"

and "Social". Again, in this group (not mentally defective), we see a definite and significant dissociation between abnormal labor and the last mentioned personality groups.

In summarizing the results of this portion of our study, we find positive results. We see a definite association between abnormal labor and the personality group "Emotionally Unstable" without consideration of the intelligence of the child. That is, this association exists whether the child is of high or low grade mental status. The retardates also show a statistically significant association between the factor "Over-affectionate" and abnormal labor. In the mentally defective, the plotted point for this characteristic is very close to the 3 sigma test. We see that other factors show a tendency to association which are very close to significance in both I. Q. groups. These are the personality groups "Seclusive" and "Egotistical". Considering the favorable personality groups, those considered as "Obedient" and "Social", we see statistically significant dissociations between abnormal labor and both of these factors. Again, in this graph it is interesting to observe that the general trend for both I. Q. groups is essentially the same. They tend to cling together, and indicate that the association between abnormal labor and these various factors is not so much a matter of intelligence of the child as it is a matter of linkage between abnormal labor and the personality factor itself. That is, we are not able to link abnormal labor, abnormal personality traits and mental deficiency. The material as it stands suggests that the association is between abnormal labor and the personality traits themselves, irrespective of the intelligence involved. In this particular portion of the work, we see an association between abnormal labor and the personality groups "Seclusive", "Emotionally Unstable," "Egotistical", and "Over-affectionate", and a significant dissociation between abnormal labor and the personality groups "Social" and "Obedient".

In view of these rather unusual relationships between abnormal labor in mothers and present emotional disturbances in the children, particularly in reference to mental deficiency, it is of interest to note the significance of these results judged by the theories of Freud and Rank. Whatever the relationship, it is to be noted that abnormal labor apparently affects the mentally

PERSONALITY TRAITS.
PERCENTAGE DIFFERENCES BETWEEN NORMAL AND ABNORMAL LABOR GROUPS.



GRAPH XIV.

0-0 line = straight line projection of normal labor percentage for both I. Q. groups. Solid line represents I. Q. group 0—.69. A plotted point of the solid line represents the difference between the percentage for a specific trait in the normal labor group and the percentage for the same trait in the abnormal labor group in the I. Q. group 0—.69. The shaded line gives the same presentation for the I. Q. group .70+. The indicator representing three sigma serves as a test of the statistical significance of the specific difference.

defective and the not mentally defective alike. There is little evidence here that there is a lack of emotional reaction in the mentally defective judging from the personality deviations associated with abnormal labor. If the trauma of abnormal birth pre-determines the emotional status of the individual, it appears to produce the same results in the child mentally defective as it does in the child not mentally defective.

SUMMARY

1. This paper outlines the Massachusetts system for the psychiatric examination of retarded school children, which has been in operation since 1915. A total of 43,975 examinations has been completed by fifteen of these traveling psychiatric school clinics.

2. The Fernald Ten-Point Scale Examination, which is a set of standardized tests, is used by all of the clinics which examine children throughout the State. This comprehensive examination covers ten different fields, giving the history and present status of each individual characteristic involved. It makes specific inquiry into the genetic, developmental, mental, physical, intellectual, social, moral and emotional status of each child examined, as well as the history of school progress and the present accomplishment in various school subjects.

3. A total of 20,473 consecutive first examinations completed by six of the traveling clinics has been studied with the purpose of determining whether there is a relationship between abnormal labor conditions and various characteristics of the child. The factors studied are: intelligence quotient, school accomplishment, order of birth, number of physical defects, type of physical defects, weight, height, diagnosis, social conduct and personality traits.

4. To be included in the group "Abnormal Labor", the recorded conditions in reference to the labor experienced by the mother must have involved one of the following: (a) Prolonged Labor, (b) Instrumental Delivery, (c) Difficult Labor.

5. After the group "Abnormal Labor" was established the material was divided into two groups: (1) Abnormal Labor, and (2) Normal Labor, according to the labor experienced by the mother of the child. The status of the children of mothers with abnormal labor was then compared with the status of children of mothers with normal labor in each of the specific factors studied. The material was divided into the I. Q. groups 0—.69 and .70+, thus preserving a comparison between two groups, one of which could be considered as mentally defective, and the other not mentally defective. In the tables, the material is further divided by sexes. Insofar as there were no marked differences, the sexes are combined in the graphic presentations. Percentage distributions are calculated for specific traits in both groups abnormal labor and normal labor. The difference between the percentage of a specific trait in the abnormal labor group is compared with the percentage for the same trait in the normal labor group. The standard deviation of the observed difference between these percentages is then calculated, and the difference itself tested by the criterion of three times the standard deviation of the difference. This method is applied uniformly in the case of each factor studied.

6. A graphic method of demonstrating these facts is presented which makes it possible to determine by inspection whether a specific trait is associated with abnormal labor in the mother. Inclusion of an indicator representing a three sigma test of significance also makes it possible to determine from any one of the graphs the significance or non-significance of the observed differences.

7. To effect a comparison between abnormal labor in mothers of retarded school children and mothers in the general population, one hundred twenty-five Massachusetts obstetricians were asked to coöperate in giving comparable figures for the population. Their statements on the incidence of abnormal labor for the general population averaged 70 per cent. Comparison with the material of this study revealed that in mothers of mentally defective children (I. Q. 0—.69) abnormal labor was observed in 13 per cent. of male births and in 11 per cent. of female births. In mothers of retarded children (I. Q. 70+) abnormal labor was recorded in 14 per cent. of male births and in 12 per cent. of female births. There appears to be little evidence here that abnormal labor occurs to a greater extent in mothers of retarded or mentally defective children than in mothers of the general population, or is particularly characteristic of the condition of either mental defect or retardation.

8. Abnormal Labor and Intelligence. There is no apparent association between abnormal labor and the intelligence quotients ranging between .30 and .79. However, there is a suggested association with the I. Q. group 0—.29 (not significant), the I. Q. group .80—.89 (not significant) and the I. Q. group .90+ (significant statistically). The findings suggest that the intermediate intelligence groupings are not in association with the factor of birth trauma, but that abnormal labor exerts its greatest influence in relationship with the I. Q. groups 0—.29, .80—.89 and .90+, particularly the latter. The negative finding of a lack of association between abnormal labor and the great bulk of cases of mental deficiency is of little moment in comparison with the positive finding of an association between abnormal labor and the dull normal or low normal groupings. The far-reaching significance of the latter finding lies in the fact that the bulk of our population lies in these higher levels of intelligence.

9. Abnormal Labor and Average Grade Accomplishment. The relationship of abnormal

labor and average grade accomplishment of the children in the subjects, reading, arithmetic, spelling, writing and language is studied. The results do not suggest that there is an association between abnormal labor in mothers and low school accomplishment of the children in any of the above mentioned subjects.

10. Abnormal Labor and Order of Birth. Abnormal labor shows a definite association with the first birth. However, the results are identical in both I. Q. groups 0—.69 and .70+, and show that there is no greater tendency for abnormal labor to be associated with the first birth in the group mentally defective than in the group not mentally defective.

11. Abnormal Labor and Number of Physical Defects. The findings reveal a suggestion of an association (not significant statistically) between abnormal labor and physical defects four or more in number.

12. Abnormal Labor and Specific Physical Defects. The findings demonstrate an association between abnormal labor and neurological defects (significant statistically). In the I. Q. group 0—.69 there is a suggestion of association with skeletal defects and in the I. Q. groups .70+, with circulatory defects.

13. Abnormal Labor and Weight. Testing the possibility of an association between abnormal labor and persistent nutritional disturbances in the child gave a negative finding. There was no association between abnormal labor in mothers and present under-average weight of their children.

14. Abnormal Labor and Height. Testing the possibility of an association between abnormal labor and interference with the factor of growth gave a negative finding. On the contrary there was demonstrated a definite association between abnormal labor in mothers and present over-average height in their children.

15. Abnormal Labor and Diagnostic Groups. There is no indication that abnormal labor is associated with any particular group of the clinical diagnoses.

16. Abnormal Labor and Social Conduct. There is no indication of an association between abnormal labor and delinquency, stealing, lying or sex offenses in the children.

17. Abnormal Labor and Personality Traits. There is an apparent association between abnormal labor in mothers and the observed characteristics "Seclusive", "Egotistical", "Over-affectionate", and "Emotionally Unstable." The association is not significant for the first three characteristics, but is significant in the case of the characteristic "Emotionally Unstable." There is also a significant dissociation between abnormal labor and the characteristics "Social" and "Obedient".

18. The material of this communication reveals that abnormal labor is in association with various mental, physical and emotional characteristics of retarded school children, apparently irrespective of the intelligence of the children involved. The observed tendency for the plotted curves for the I. Q. groups 0—.69 and .70+ to identify themselves with each other in practically every factor studied suggests to us that we are viewing an association between abnormal labor and the factor itself, and not a linking of abnormal labor, the factor, and mental deficiency. Whatever effect birth trauma may have upon the various factors studied, it appears to exert this influence impartially upon both groups, whether mentally defective or not mentally defective.

CONCLUSION

The findings of this study add many new facts to our knowledge of the relationship between abnormal labor, mental defect and associated conditions. The findings render imperative immediate study of the demonstrated association between abnormal labor and children in the higher intelligence groupings; that is, those in the dull normal or low normal classifications. They also point out the great need for additional study of the newly demonstrated relationships between abnormal labor and physical and emotional factors. These may prove to be of more vital importance than the association between abnormal labor and certain grades of intelligence.

The writer wishes to express his appreciation to the following Superintendents of State Hospitals and Schools, who have extended their coöperation to him and to the Department research workers: Drs. Ransom A. Greene, George L. Wallace, C. Macfie Campbell, Roderick B. Dexter, Elisha H. Cohoon and John A. Houston.

DIPHTHERIA PREVENTION IN LOWELL, 1928 AND 1929

BY JOHN J. MC NAMARA, M.D.,* AND GEORGE M. SULLIVAN, M.D.*

FROM 1913, which marks the birth of toxin-antitoxin, there has been available a safe and practically certain preventive against diphtheria. Since that time there have occurred in Lowell 3,245 cases of diphtheria, which have resulted in 340 deaths.

*McNamara—Director of School Hygiene, Lowell, Mass. Sullivan—State District Health Officer, Lowell. For records and addresses of authors see "This Week's Issue", page 438.

During the past year an explosion and a fire in the City of Cleveland, Ohio, was the cause of an agonizing loss of 125 lives. Screaming headlines and vivid photographs heralded this catastrophe in the press of the United States. Searching investigations to ascertain the cause and to place the blame where it rightfully belonged were instituted at once. Almost immediately, not only in Cleveland but in other cities,

laws and ordinances were promulgated to the end that a similar sacrifice of life should not occur elsewhere.

Over 10,000 lives, almost a hundred times as many lives as were lost in the Cleveland disaster, were ruthlessly wiped out by diphtheria in the United States last year and in the City of Lowell alone 14 lives were sacrificed to this same disease. Did the press of the nation broadcast this (needless) slaughter? Did the cameramen of the country hasten to set up their cameras at the bedside of any of these thousands of children as they struggled in the suffocating grip of laryngeal diphtheria? Quite to the contrary, their deaths had little news value other than to a small group of health officials interested in conservation of child health. They struggled for a short time and died. Their deaths were recorded in the routine way and, except in a few cities of the country, little or nothing was done toward preventing the annual recurrence of this slaughter of the innocents. The holocaust went on.

In the eighteenth century, Mediterranean pirates demanded a tribute of lives and moneys from American citizens. This country promptly instituted an aggressive campaign to protect her people against such outrages and destroyed these brigands. A far greater sacrifice and a far more costly one is demanded of the people in the United States each year,—yes, and up until now, paid almost without a murmur or with but a feeble protest,—the annual tribute and sacrifice of thousands of child lives to the minotaur Diphtheria!

Is it because this tribute is exacted from only the very young who cannot protest, whose protectors, the doctors, the health officials, and in many cases the parents, too, have apparently seen fit in the safety of their adult years to close their eyes to this horrible and needless sacrifice?

Realizing that these deaths in Lowell should not have occurred, those most interested in the prevention of this disease appreciated that, if future needless slaughter were to be avoided, a preventive campaign must be instituted and the public advised as to the best methods of protection.

To this end a diphtheria prevention program was begun in Lowell, July, 1928. A free toxin-antitoxin clinic was inaugurated under the supervision of the author at the Edson Health Center, a summer endeavor sponsored by the Lowell Tuberculosis Council. The response of the public to this first attempt of diphtheria prevention was so generous and the requests from districts not accessible to the clinic so numerous, that several weekly clinics were arranged in schoolhouses in other parts of the city, during the summer. The personnel of these various clinics was made up by the volunteer services of some six or eight physicians, assisted by Health Department nurses.

In the fall of the same year this work was undertaken on a larger scale as a part of the program of the Division of School Hygiene, at which time an attempt was made to immunize as many as possible of the school children under 12 years of age then attending public or parochial schools.

In addition to these two endeavors, immunization against diphtheria was offered by the Lowell Nurses Visiting Association at their infant welfare quarters.

EARLY ACCOMPLISHMENTS TOWARD PREVENTION (SEE TABLE I)

The net result of all these attempts at diphtheria prevention in Lowell during 1928 was that a total of 13,776 children received three inoculations of toxin-antitoxin. This number comprised 3,012, or 21.9% of the total number of children of pre-school age, and 10,764, or 47.9% of the children of school age. (See statistical table of immunization work.)

An analysis of these figures, together with the birth record and death rate for the past six years, revealed that in spite of the generous response to the summer clinics and school immunization, there still remained in Lowell many children of pre-school age, upwards of 10,000, or about 78%, who had not received this protective treatment against diphtheria. Moreover, what was most important as regards the prevention and eradication of this disease, it was also realized that this very group, aged 6 months to 6 years, constituted the class most susceptible to diphtheria. (See Table II.)

TABLE I

ADMINISTRATION OF TOXIN-ANTITOXIN—LOWELL

(Number of Children Receiving Three Inoculations)

Age Group	1928 Number	1928 Per Cent. Total Population	1929 Number	1929 Per Cent. Total Population	Total Number	Total Per Cent. Total Population
6 mos. to 1 yr.	0	—	1292		1292	
1-5 yrs.*	3012	22%	5612	50%	8624	72%
6 yrs. and up	10764	48%	4472	15%	15236	63%
Unknown	—		300		300	
Total	13776		11676		25452	

*Most of the children in this group were between 14 mos. and 2 yrs.

Diphtheria, like some other diseases, has a tendency to occur in waves. While for the past several years there has been a downward fluctuation, or what might be called an ebb tide in its incidence, nevertheless, from analysis of previous statistics we might reasonably expect an increase in the number of cases.

Therefore, because there still remained this large and very susceptible pre-school group, of which only a small percentage had been immunized, and because of this anticipated increase in incidence, it was readily appreciated by the Health Department that something must be done at once by way of offering immunity to this group, if anything were to be accomplished toward the prevention of diphtheria in Lowell. For these reasons the Health Department decided to institute an intensive and active campaign to eradicate this disease.

A conference was held with the District Health Officer of the State Department of Public Health by the Director of the Diphtheria Prevention Campaign to formulate a coöperative plan of action. As a result of the conference, a program was decided upon which had for its purpose the providing of adequate means for securing immunity to diphtheria for all children of the city, and more especially for the pre-school child.

The Director of School Hygiene was privileged to undertake this work and there was placed at his disposal all the facilities of the local health department as well as extra physicians and the assistance of the State Department of Public Health.

Knowing that success in the proposed campaign would depend in a large measure on the amount of knowledge disseminated to the public, and the extent to which the parents might be aroused to the necessity of securing this protective treatment, a two-week intensive publicity campaign was conducted previous to the initial clinic in July, 1929.

TABLE II

DIPHTHERIA CASES AND DEATHS
LOWELL—1913-1929

Year	Cases Reported Under One Yr.	Deaths Under One	Cases Reported Under Five Yrs.	Deaths Under Five	Cases Reported Under Ten Yrs.	Deaths Under Ten	Reported Cases All Ages	Deaths All Ages
1913	5	2	98	30	181	36	267	36
1914	3	1	63	15	103	20	154	26
1915	13	1	84	19	152	25	206	25
1916	29	2	140	28	234	28	308	41
1917	33	2	171	15	286	21	438	24
1918	27	2	184	11	143	16	186	17
1919	18	2	198	5	175	21	234	23
1920	6	1	93	17	175	20	254	20
1921	6	3	104	22	196	34	263	35
1922	7	3	91	13	149	15	213	16
1923	4	3	57	10	98	14	120	14
1924	4	1	50	8	84	10	113	10
1925	0	0	20	2	38	3	50	4
1926	0	0	26	2	58	6	70	6
1927	4	1	59	10	168	17	194	18
1928	0	0	34	6	84	11	110	13
1929	0	0	28	7	52	14	65	14

INITIAL PROBLEMS

At the outset the following problems presented themselves:

(a) A certain lack of intimate knowledge concerning the subject of diphtheria prevention in general on the part of the public.

(b) An unfamiliarity with such scientific nomenclature as "toxin-antitoxin", etc.

(c) A fear of possible undesirable results from the inoculation.

SALIENT FEATURES OF METHODS USED IN ATTACKING THESE PROBLEMS

Aids available for the dissemination of knowledge:

The press.
The clergy.
Mimeographed circulars through
  Schools
  Milk dealers
  Mills, factories
  Insurance companies
  Miscellaneous
Theatres
Signs and posters.

1. *The Press.*—The value of the coöperation and assistance of the press cannot be stressed too strongly. It is, perhaps, the most effective way of stimulating public interest. Newspaper publicity should be worked up, as it was in Lowell, according to a certain definite plan, which should have for its climax and goal the first clinic day. For example, following almost daily public endorsements by important people, a front page editorial, the night before the initial clinic, no doubt did a great deal toward "putting the Lowell Clinic over". Press articles, to be of value, should be brief and should

be written with as few scientific words as possible. Valuable public endorsements for such endeavors can be secured from such people as the mayor, superintendent of schools, medical director of schools, president of medical society, Chamber of Commerce, president or officers of such organizations as tuberculosis associations, the Red Cross and the like.

2. *The Clergy.*—The approval of the clergy of all denominations was secured. A form letter prepared by the Director of the Diphtheria Prevention Campaign, explaining the value of immunization, was read from practically every pulpit in the city. A pastoral letter of Cardinal Hayes of New York, sincerely requesting and advising the immunization of the children of the parochial schools of New York was quoted in these circular letters and in the press.

3. *Mimeographed Circulars.*—Over 140,000 carefully prepared mimeographed circulars were made out in several languages: English, French, Polish, Portuguese and Greek. They explained briefly, concisely and clearly not only what immunization was, but also its value and the entire lack of danger incidental thereto. This printed propaganda helped to familiarize the public with such scientific words as toxin-antitoxin, immunity, etc., and gave them a definite idea of just what diphtheria prevention meant.

These mimeographed circulars were placed in nearly every home in Lowell through the following channels:

(a) Through the schools—About 50,000 circulars, carrying two separate messages, were distributed to the school children with definite instructions to put them in the hands of their parents. About 20,000 of these carried the diphtheria prevention message as part of the request for the Summer Round-Up or Pre-School Conference. Every circular voiced an appeal for immunization not only of the school child but also of any pre-school children there might be in the family.

(b) Through the milk dealers—Some 32,000 were distributed to the homes of the city through the agency of the various milk dealers. A circular was left with each bottle of milk delivered in the morning.

(c) Mills, factories, public service, etc.—About 35,000 were given to the operatives in the various factories and mills, and to the personnel of the different industrial establishments in the city. This was arranged for by conferences with the agents, superintendents, managers and foremen. Firehouses, public service works, such as Street and Sewer Department, Water Works, etc., were also thoroughly circularized.

(d) Through the insurance companies—Some 17,000 circulars were delivered to the Metropolitan Insurance Company and the John Hancock Insurance Company for distribution by their district salesmen throughout the city and outlying districts.

(e) Through miscellaneous channels—In addition, several thousands of these circulars were placed in homes by various nursing organizations such as Health Department nurses, Tuberculosis nurses, Child Welfare Nurses of the Health Department and the Visiting Nurse Association.

4. The theatres—Stereopticon slides, screen announcements and short talks in several of the theatres served to bring the message of diphtheria prevention to many people.

5. Signs and posters, etc.—Many large signs and posters, carrying a plea for diphtheria prevention and telling the location and time of the clinic, were displayed by previous arrangement. These were set up in the most conspicuous and advantageous positions throughout the city, such as in large commercial establishments and stores, at well-patronized car stops, public squares and junctions of several streets.

CONDUCT OF THE CLINIC

4. *Location of Clinic Important.*—The relative importance of the location of the clinic depends on whether the work is to be carried on in one large central clinic or in several small clinics, each serving separate parts of the community. Both of these methods were given a thorough test in Lowell. The 1928 campaign offered immunization at summer clinics in various parts of the city and the school immunizations in the same year were carried on in each school district. The intensive or "high pressure" diphtheria prevention program of 1929 was centralized in one large downtown clinic. Whenever this method is contemplated, the location and the type of clinic quarters assume major importance, and there are several essential requirements which bear an important relation to the success of such a clinic.

(a) Requisites as regards location:

(1) It should be centrally located.
(2) It should be reasonably accessible to all parts of the community.
(3) It will be of advantage if the description of the clinic to the public can include its proximity to some well-known public building, as a school, a theatre, or a well advertised commercial or industrial establishment.

(b) Requisites as regards clinic quarters:

The quarters should be selected with an idea of their adaptability to the particular work intended. If large numbers of children and parents are to be handled without confusion, certain requisites for clinic quarters are necessary, such as:

(1) Situation on the ground floor.
(2) Separate entrance and exit.
(3) Ample room for record clerks and provision for adequate record-taking at the entrance. Failure of this phase of

the work in Lowell resulted in the loss of valuable statistics.

(4) Opportunity for rearrangement of clothing before leaving.

(5) Good illumination, either natural or artificial.

(See diagrammatic representation of Lowell clinic, where 4000 were handled in one morning.)

(c) Free car transportation.

(1) Electric — arrangement with street railway.

(2) Motor — privately owned, organizations, etc.

The practical application of both methods in Lowell demonstrated the fact that in organizing a diphtheria prevention program for a city of about 100,000, separate clinics in various parts of the city seem to offer the best opportunity. Also, that the immunization of both the school and the pre-school child at one time in each school district is perhaps the most efficient manner for conducting this work.

For administrative reasons the preliminary Schick test was not employed.

1. The Forsbeck Syringe* is perhaps the greatest single aid to the actual work of diphtheria immunization with toxin-antitoxin on a large scale. This apparatus, devised by Dr. Filip C. Forsbeck, Epidemiologist of the Massachusetts State Department of Public Health, makes possible not only rapid inoculation, but also insures a very accurate and sterile method. It is simple to set up, easy to manipulate and withstands considerable usage. The cost of the complete equipment is very moderate and the syringe, if handled carefully, will last a long time.

Rapid handling of these large groups is very important inasmuch as it is not desirable to detain these mothers, many of them with babies in their arms, or leading tiny tots by the hand, for lengthy periods hemmed in by struggling and impatient crowds.

2. Personnel of Clinic.

The personnel of such a clinic should receive considerable thought. The immunizing physicians should be selected because of previously demonstrated ability, sympathy with the work in hand, and the like. Both the medical and nursing personnel should be adequate in numbers. The organization and assignment of the individuals should include definite and specific tasks for each one, i.e., certain nurses should prepare the arm; others should assist the doctor in the actual work of inoculation; others should care for sterilization of needles; others should be charged with the care of the serum itself; others should wash the arm after inoculation. In this way confusion and duplication of tasks may be eliminated.

*This syringe was described by Dr. Forsbeck in the Am. J. Public Health, Vol. XVIII, No. 11, November, 1928, p. 1407.

3. *Records.*

The obtaining of adequate records in these clinics, especially in the case of the large central type, presents an exasperating problem. The name, address, age, etc., must be recorded at the time of the initial inoculation and checked off on the two successive visits. From observation at the Lowell Clinic, it would seem worth while to evolve some card or tag which might be given out at the first clinic and stamped at the other two. However, experiments with this method met with poor success, many of the cards being lost, etc.

The amount of knowledge concerning diphtheria prevention disseminated to the public through the various avenues of publicity mentioned in the foregoing paragraphs of this article, and the consequent stimulation of public interest, will determine the response on clinic day. Failure to "sell" the idea of immunization means either lack of effort on the part of those in charge of the campaign or inability to place the facts before the public in an appealing manner.

It must be remembered that preventive medicine is largely a matter of education. Therefore, for the successful completion of any such work as a diphtheria prevention campaign a definite and intensive program of health education is necessary. What does this mean? It means that the public must be thoroughly familiarized with certain new terms and new phrases such as "toxin-antitoxin", "immunity", etc. They must also be advised and educated not only as to the purpose of the treatment,—in this case the prevention of diphtheria,—but also they must be told whether it is dangerous; and when, where and how it will be done. One can readily see that it is impossible to do all this,—namely, to acquaint the public with all these facts and to stimulate their interest so that they are not only prepared but anxious to accept what amounts to a new habit,—unless sufficient time is allowed in which to carry on an education campaign through which the necessary knowledge may be disseminated and broadcast. The manner in which this was accomplished in Lowell has already been related.

Contrary to some expressed opinions, a diphtheria prevention campaign as conducted by a health department reacts to the benefit of the private physician. It was the experience of many physicians, during the diphtheria prevention campaign, that more children than previously were presented to them for immunization. This was due, undoubtedly, to the great amount of publicity carried on and the knowledge concerning diphtheria prevention disseminated by those in charge of the campaign.

A program such as a diphtheria prevention campaign should have a director responsible for the organization of the work and its publicity, one to whom the public may look for definite information and who will be in a position to advise

them concerning all phases of the contemplated work.

Public safety and the protection from fire and accident of the lives and bodily welfare of those attending the clinic should receive consideration. The danger, especially the danger from fire, to large groups of people congregated in one place, many of tender age, always presents a serious problem. Since sterilization of needles is usually accomplished at these clinics by use of an open flame, great care should be exercised in the handling of ether or alcohol. It is advisable to have a well tested fire extinguisher at hand.

As another safeguard, competent traffic control of the immediate neighborhood of the clinic at the time of the arrival of large numbers of women and children will be seen to have considerable importance. This particular problem can be delegated to the officer in charge of the city traffic.

CONCLUSIONS

In spite of the fact that diphtheria is almost entirely preventable, in many communities little or no attention has been given the problem and as a result practically no protective bulwark against this disease has been established. This is especially true in regard to that most susceptible group—pre-school children. A careful inventory of diphtheria prevention work in many communities will reveal an almost utter lack of protection for the pre-school child. It is a recognized fact that this group furnishes the material most susceptible to diphtheria.

Diphtheria prevention, on the whole, is inexpensive as compared with many other health measures, most of which do not pay so large, or nearly so rapid, returns for the amount of money invested.

An analysis of the cost of the Lowell diphtheria prevention campaigns of 1928 and 1929 may be of some value. During these two years well over 25,000 children received the required three inoculations. The expenses were divided as follows: medical services $727.50; supplies, $1,090.67 (of the latter amount $275 was for printing). This makes a total of $1818.17. The cost, then, of giving 100 children three prophylactic inoculations each would be $7.00, or about 7c per child.

Of course, in both these campaigns we made considerable use of the Health Department personnel at no additional cost. We did, however, hire some extra assistants for which $727.50 of the above total was expended.

In view of the foregoing facts, can any logical reason be advocated for refusing this safeguard? Can any health department advance any legitimate reason for its neglect to arrange and provide for the thorough immunization of its community? Can any parent honestly justify his failure to have his children protected by the administration of this serum? The answer is written in the 10,000 needless deaths in the United States during the past year.

No community should be left unprotected. Campaigns in several municipalities show that the parents and the medical profession are willing and anxious to do their part. The failure of a city or town to be thoroughly immunized rests mostly upon the lack of activity of the health officer in charge and his failure to give adequate advice.

SUMMARY

1. During 1928 and 1929, the City of Lowell, through its Health Department and under the immediate supervision of the Director of School Hygiene, treated approximately 25,000 children with toxin-antitoxin.

2. At one large clinic in the center of the city, there were treated during a period of eight weeks not quite 15,000 children, more than half of whom were in the pre-school group. As many as 4,000 were treated in one morning.

3. The success of the clinic was undoubtedly due to the intensive two-week period of publicity preceding the first clinic and the coöperation of every medical, civic, industrial and commercial group with the organized health authorities in the community.

4. The approximate cost of three treatments per child was $.07.

ON DIAGNOSING PULMONARY TUBERCULOSIS AS ANOTHER CONDITION

BY LINSLY R. WILLIAMS, M.D.,* AND ALICE M. HILL, A.B.*

THAT a patient with pulmonary tuberculosis frequently loses much, if not all, of his chance of returning to a life of reasonably normal activity because, for one reason or another, there has been a delay in arriving at the true diagnosis of his condition, is common knowledge. The National Tuberculosis Association, as part of a study of what happens to tuberculous individuals prior to their admission to a sanatorium[1], sought to find out something of the extent to which various causes were responsible for delayed diagnosis. In other papers the length of time the patient permitted to elapse before seeking medical advice and that the physician allowed to pass before telling the patient that the latter had tuberculosis have been discussed; also the diagnostic aids employed by the physician in

*Williams—President of New York Tuberculosis and Health Association. Hill—Statistical Field Service, National Tuberculosis Association. For records and addresses of authors see "This Week's Issue", page 438.

determining the diagnosis of pulmonary tuberculosis. The present report is concerned with the various diagnoses given to patients during the course of the illness which eventually brought them to the sanatorium with pulmonary tuberculosis.

It may be well to restate here that the study, of which this particular report is a part, is one regarding the experiences of 1,499 patients prior to their first admission to a sanatorium because of having active pulmonary tuberculosis.

Twenty per cent. of these patients, 307 in number, received a diagnosis of pulmonary tuberculosis at their first consultation with a physician, many others as soon as the physician had been able to ascertain the results of sputum and roentgenological examinations. In a considerable number of other instances the patient was advised that nothing was wrong; frequently he was told nothing at all; or, quite legitimately, that the physician was uncertain as to the nature of the illness.

But in 1199 instances the physician told the patient that his ailment was something other than pulmonary tuberculosis. From the histories it is not possible to distinguish among those instances in which the physician did not tell the patient the truth under the impression that the mind would rest easier if he did not know the actual state of affairs; those in which the diagnosis was correct at the time and in which the pulmonary tuberculosis developed out of the condition so diagnosed; those in which the physician expressed the conclusion he did simply because he did not have the time or disposition to go into the case with sufficient thoroughness; and those in which the symptoms were so similar to those of phthisis that in all honesty the physician made an incorrect diagnosis upon a reasonably thorough knowledge of the case. But whatever the reasons for the diagnoses as stated to the patients, it is hoped that a presentation of them here will prove of some assistance to physicians who will be called upon in the future to diagnose the cases of patients with similar symptoms.

All the diagnoses which each patient received from successive physicians, or the several which may have been stated to the patient by one physician, cannot be indicated here. What is set forth is the number of instances in which a patient was advised by a physician that he had a specified ailment. For example, if a patient was told by successive physicians that he had bronchitis, rheumatism, intestinal stasis, and indigestion—as happened to one before a fifth physician bethought himself to examine the sputum—each has been counted once; had the same four diagnoses been given the patient by one physician on succeeding occasions, each likewise would have been counted once; if one patient was given the same diagnosis three times, this has been counted three times.

As might be expected, the major number of these diagnoses, 692, or 57.7 per cent., were diseases of the respiratory system (See table). They include not only bronchitis, pneumonia, pleurisy, asthma, colds and laryngitis, but others loosely expressed as "something wrong with the chest," "cigarette cough," "lungs coated." Outside of this group, influenza, like tuberculosis an infectious disease, was reported the greatest number of times, 114, or 9.5 per cent. of all. There is no way of telling in what proportion of these instances the influenza broke down resistance to such an extent that a latent tuberculosis was enabled to become active and in what proportion the influenza was actually an unrecognized case of pulmonary tuberculosis in an acute form. But the figure is interesting in view of the fact that after each serious influenza epidemic the death rate from tuberculosis rises.

Another large group of diagnoses refers to diseases of the digestive system, including those not only of the stomach but also of the pharynx and tonsils, appendix, intestines and the liver, 103, or 8.6 per cent. of the total. The number of instances in which ulcer of the stomach and stomach trouble were said to be the ailment indicate the need for greater recognition of the fact that indigestion and loss of appetite are important symptoms of tuberculosis.

The 99 instances of ill-defined diagnoses, such as general run-down condition, malnutrition, mixed infection, overwork, and the like, were for the most part obviously terms used by the physician to cover up the fact that he had not gone into the case with thoroughness.

More of these diagnoses of something other than pulmonary tuberculosis were given the men than the women—660, or 55 per cent. to men, 539, or 45 per cent., to women. It may be that more women than men were told nothing as to the character of their illness. It would be interesting to know just how much these diagnoses delayed the entrance of the patients to the sanatoria. The distribution as to the percentage of these diagnoses given to men who were, respectively, minimal, moderately advanced, or far advanced cases on admission did not differ appreciably from the percentage of the men themselves in those stages at admission. But the percentage of these diagnoses which were given to women who were in the far advanced stage of the disease on admission was noticeably greater than the average percentage.

Although the figures may be due to chance, it seems worth while to call attention to a few diseases which were diagnosed much more frequently in one sex than in the other. In only half as many instances were women judged to have a disease of the digestive system as men; in the case of stomach diseases, specifically, in less than one-fourth as many. On five occasions women were told that their hemorrhages did not come from the lungs and were non-tuberculous in character, in contrast to the thirteen when

men were so told. Only once was a woman said to have typhoid fever, while men were told so on eight occasions. On the other hand, only once was a man informed that he had a disease of the thyroid gland, while women were so diagnosed eight times. Women, in more instances than men, were advised that they were suffering from anemia, and from some ill-defined cause.

That in many instances physicians simply gave expression to a snap judgment is indicated by the following abbreviated histories:

NUMBER OF INSTANCES IN WHICH SPECIFIED DIAGNOSIS—OTHER THAN PULMONARY TUBERCULOSIS—WAS MADE BY PHYSICIAN

(Not including instances in which the patient was told nothing or that nothing was wrong, or the like)

Specified diagnosis, other than pulmonary tuberculosis, given to patient by physician	Total	Male				Female				
		Total	Minimal	Moderately Advanced	Far Advanced	Total	Minimal	Moderately Advanced	Far Advanced	Unknown
Total	1199	660	74	286	300	539	49	224	266	—
Typhoid fever	9	8	—	2	6	1	—	—	1	
Measles	2	2	—	2	—	—	—	—	—	
Scarlet fever	1	1	—	—	1	—	—	—	—	
Whooping cough	5	—	—	—	—	5	—	1	4	
Influenza	114	60	3	28	29	54	5	27	22	
Dysentery	1	1	—	—	1	—	—	—	—	
Tuberculosis, other than pulmonary	27	16	3	3	10	11	—	5	6	
Syphilis	1	1	—	1	—	—	—	—	—	
Malaria	13	5	—	4	1	8	—	5	3	
Streptococcus infection in lungs	1	1	—	1	—	—	—	—	—	
Cancer	3	1	—	—	1	2	1	—	1	
Rheumatism	4	3	—	2	1	1	—	—	1	
Diabetes	2	2	—	—	2	—	—	—	—	
Diseases of the thyroid gland	9	1	1	—	—	8	—	4	4	
Other general diseases	3	1	—	1	—	2	—	1	1	
Hemorrhage without specified cause (other than pulmonary)	18	13	—	12	1	5	—	2	3	
Anemia	13	3	1	—	2	10	—	5	5	
Abnormal blood pressure	3	1	—	1	—	2	1	—	1	
Diseases of the nervous system	30	15	3	8	4	15	—	7	8	
Diseases of the ear	2	2	1	—	1	—	—	—	—	
Diseases of the heart	14	11	3	5	3	3	1	—	2	
Diseases of the lymphatic system	3	3	—	—	3	—	—	—	—	
Diseases of the nasal fossa and their annexa	5	3	1	2	—	2	—	—	2	
Diseases of the larynx	12	11	—	3	8	1	—	1	—	
Bronchitis	205	99	7	43	49	106	9	40	57	
Broncho-pneumonia	12	8	—	3	5	4	—	3	1	
Pneumonia	56	33	4	11	18	23	2	9	12	
Pleurisy	165	94	15	44	35	71	7	39	25	
Congestion of the lung	10	3	—	3	—	7	1	4	2	
Asthma	14	11	2	2	7	3	—	2	1	
Cold—unspecified	151	88	11	40	37	63	6	21	36	
Other diseases of the respiratory system (largely unspecified)	62	28	3	10	15	34	5	13	16	
Diseases of the mouth and annexa	4	4	—	1	3	—	—	—	—	
Diseases of the pharynx and tonsils	39	19	1	9	9	20	—	8	12	
Ulcer of the stomach	9	7	—	6	1	2	2	—	—	
Other diseases of the stomach	27	22	6	11	5	5	1	1	3	
Diarrhoea and enteritis	3	2	—	1	1	1	1	—	—	
Appendicitis	6	3	—	1	2	3	—	3	—	
Other diseases of the intestines	7	7	1	2	4	—	—	—	—	
Diseases of the liver	8	5	—	1	4	3	—	1	2	
Diseases of the kidney	7	5	—	1	4	2	—	2	—	
Diseases of the bladder	3	—	—	—	—	3	—	2	1	
Diseases of the female genital organs	3	—	—	—	—	3	—	—	3	
Pregnancy (including ectopic gestation)	2	—	—	—	—	2	—	2	—	
Diseases of the cellular tissue	3	2	—	—	2	1	—	—	1	
Diseases of the organs of locomotion	4	4	1	1	2	—	—	—	—	
Malformations	3	3	1	—	2	—	—	—	—	
Trauma	2	2	—	1	1	—	—	—	—	
Ill-defined	99	46	6	20	20	53	7	16	30	

One woman was told in June that she had neuritis and should not sleep in a draft; in October that she had pharyngitis and should gargle; in November that she had enlarged tonsils and should have an opera-

tion; in January that she was run down and needed rest and a special diet; in February that she had tuberculosis. When admitted to the sanatorium in March she was in a far advanced stage of the disease.

One patient was told in January that she had an abscess; in May, a cold; in July, gastritis; none of the three physicians who made these respective diagnoses made an examination of any sort. In November a fourth physician advised the patient that she had pleurisy; in December a fifth diagnosed her as having an ischiorectal abscess and pulmonary tuberculosis. She was admitted to the sanatorium in January with far advanced tuberculosis.

A third woman was told in the course of two years by three physicians that she had anemia, typhoid fever, bronchitis, whooping cough, bronchial catarrh, and that she was lazy. Within a week of the "lazy" diagnosis she had consulted another physician and had been admitted to the sanatorium as far advanced.

A man who entered the sanatorium as a moderately advanced case was told in the course of six months by five physicians, respectively, that he was suffering from sprained intercostal muscles, lumbago, kidney trouble, stomach trouble, and finally pulmonary tuberculosis.

Another man had been treated by his first physician, who saw him fifty times between August and the next April, for typhoid fever without a Widal test being made. In July he consulted a second physician who had the sputum examined and a roentgen ray picture made of the chest and then made a diagnosis of tuberculosis. When admitted to the sanatorium in October, the patient was classified as moderately advanced.

A third man was seen twice a week during the month of May by a physician who made a diagnosis of ruptured vessel in the throat, gave him medicine to increase blood coagulation and told him to keep on working. The second physician made a diagnosis of acute bronchitis in September and though he saw the patient every day for two months, then twice a week until April, 1927, did not change his diagnosis so far as the patient knew. The first physician did not strip the patient to the waist, and neither the first nor the second used a stethoscope on the patient or made any sputum or roentgenological examination. The patient was put on sanatorium regimen at home in September, 1926, but was not advised to consult the specialist who first made the diagnosis of tuberculosis until two weeks before admission to the sanatorium.

The fact that the five most common symptoms of tuberculosis—cough, being too easily tired, loss of weight, loss of appetite, and pain in the chest—, especially the first four, are present in many other diseases calls for exceeding care in diagnosis—for the utmost use of special diagnostic facilities whenever there is any possible reason for suspecting tuberculosis. Failure to use such aids may mean loss of life to the patient.

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PSITTACOSIS

A Report of Four Cases

BY HARVEY E. WELLMAN, M.D.*

On December 25, 1929, Mrs. M. received a South American parrot, which had been purchased several days before in Boston, Mass. Until Christmas the bird had been very lively, but on that day seemed quieter and ate little. On the succeeding days a severe diarrhoea developed, it refused all food, its feathers became ruffled and unkempt, and it grew too weak to stand on its perch. Four days after Christmas the parrot had a convulsive attack and died. Unfortunately the bird was disposed of before the members of the household whose cases are reported below, became ill.

REPORT OF CASES

Case 1—On January 1, 1930 Mrs. M. complained of headache and general malaise but was able to be up and about the house. Three days later, she went to bed believing she had the "grippe" but did not call me until the sixth day. At that time, her temperature was 102° F, pulse 90, and respirations 25. She showed marked prostration and complained of generalized pains but most severe in the back of the neck and head. The physical examination was negative except for the base of the right lung. This area showed slight dullness on percussion, increased voice sounds, bronchial breathing and a few moist râles. The white blood count was 7,000+; a blood culture, sterile; and a Widal test, negative. The following day the temperature rose to 103.6°, the pulse average about 100, and the respirations 40. The patient was restless and worried, complained of severe headache, and of "feeling tired." During the night she vomited about an ounce of greenish fluid. For the next four days her condition remained about the same—she was very restless, noisy and disoriented at times, although her temperature showed a downward curve, her pulse came down to 80, and her respirations to 25. At the end of this period the white blood count had risen to 9,000+. On the fourth night, within an hour, the patient's abdomen became greatly distended, and for the first time since the onset of the disease, her pulse was of very poor quality. Several enemas gave no fecal and poor gas results. Finally, a turpentine enema gave slight gas results, followed through the night by the expulsion of large amounts of gas, relieving the distention. The next afternoon, her temperature rose to 101.6°, the pulse to 102 and the respirations to 50. The entire right lung was dull on percussion and moist râles were heard throughout. There was, also, a small area of dullness, bronchial breathing and râles at the left apex. She refused all liquids, and went into coma. Her abdomen again became distended and she stopped voiding. (On catheterization, 15 ounces were obtained.) Pituitary extract, followed by an enema, gave good gas and fecal results. On the sixth day there was no marked change. A blood culture done at this time was sterile, and the Widal test negative. On the seventh day her temperature dropped to 99°. The respiration and pulse became

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slower and of better quality. She became more rational, but for several days complained of "griping" abdominal pains. From then on, her condition steadily improved. She took fluids well and voided small amounts frequently. The distention disappeared. The white blood count was 12,000+. On the ninth day, after voiding normally for two days, she voided 28 ounces and, four hours later, 14 ounces. By this time her temperature was normal. A few days later the pulse was between 70 and 80 and the respirations between 20 and 25. At no time during the course of the disease was there a productive cough, palpable spleen or rose spots.

CASE 2—Four days after the onset of Mrs. M.'s illness, Mr. M. complained of headache, backache and general malaise. His temperature was 101° and the next morning rose to 103°. The pulse was 98 and the respirations 22. The physical examination was negative except for the lungs, which showed dullness, râles and bronchial breathing at the left base. He was not so toxic as Mrs. M., although his response to questions was slow and deliberate. On the third day of his illness, a urine examination showed a large trace of sugar, a trace of acetone but no diacetic acid. This cleared quickly with insulin. Due to the diabetic condition, he was taken to the Rhode Island Hospital. His temperature remained elevated, reaching 104° on the fifth day. From then, it began to decline, reaching normal on the twelfth day. Throughout the course of the fever, the pulse remained about 90 and the respirations never rose above 25. Râles could be heard at both bases, more marked at the left, for ten days. During his stay of four weeks in the hospital, his urine showed slight traces of sugar occasionally and a least possible trace of albumen. The fasting blood sugar was never above normal. After his discharge from the hospital, as he became more active, the amount of insulin was gradually reduced and he was finally able to omit it entirely. While in the hospital, repeated attempts were made to isolate an organism similar to the one described in the literature as causing psittacosis, but none was found. The blood cultures were sterile and the Widals negative. Stool cultures showed no organisms of the typhoid group. The sputum showed no catarrhalis or pneumococcus. The white blood count, during the first few days of the disease, was 11,000+. The differential count was within normal limits. The red blood count was 4,800,000, with a hemoglobin of 100%.

CASE 3—Five days after the onset of Mrs. M.'s illness, the daughter, Miss M., complained of general malaise and said she had not felt well for several days, but "thought it was a cold." Her temperature was 100.4°, the pulse 124 and the respirations 26. The physical examination showed dullness on percussion and râles at the base of the left lung, but was normal otherwise. The second day, her temperature rose to 102.4°, the pulse was 112 and the respirations 24. During the day, she vomited a small amount of greenish fluid and complained of nausea and pain in the back of the neck. On the fourth day, she vomited again and complained of persistent gas pains in the left side of the abdomen, which radiated from the back to the front on deep inspiration. Her temperature rose to 104°, but the pulse dropped to 104 and the respirations to 20. During the fifth day, the temperature remained elevated. The area of dullness and râles increased, and a small area of bronchial breathing with moist râles was found at the left apex. She complained of pain in the left side of the chest on deep inspiration and of severe pain in the left shoulder, which persisted for several days. The temperature ranged between 100° and 102° for several days, then fell gradually, reaching normal on the twelfth day. The pulse was between 80 and 90. During the early stages of her illness, she was constipated, but had no abdominal distention. She vomited frequently and, on one occasion, the vomitus showed the same organisms found in the mother's vomitus and stool cultures. Several blood cultures were sterile and the Widals negative. On the twentieth day she complained of pain in both wrists and ankles, which persisted for four days. At no time were the joints swollen or inflamed.

Biological Report on Cases 1 and 3

Twenty specimens, including blood, vomitus and feces, were examined. In no case was the organism described by Nocard as Salmonella psittacosis isolated from any specimen. From the vomitus of both cases there was isolated a species of the genus Serratis—probably pyoseptica. This organism was highly pathogenic for guinea pigs, killing in twenty-four hours, with as small as 0.01 c.c. injections of a twenty-four hour broth culture. The virulence of the organism was lost after some twenty-five transplants on artificial medium. From the feces, there was isolated a member of the Salmonella genus, not, however, psittacosis, since it fermented xylose with the production of both acid and gas. This species was pathogenic for guinea pigs only in 0.5 c.c. amounts of a twenty-four hour broth culture. The organism did not agglutinate even in high concentrations of paratyphoid alpha and beta sera. Species unidentified.

CASE 4—(Obtained from the records of the Providence City Hospital)—A relative of the above family, who was visiting them on the day the parrot died, two weeks later had a severe chill. The next day, she became much worse and felt "as though every part of her body was sore." On the third day, she had a high fever, felt very tired, but had no pain—only a generalized stiffness. She was admitted to the hospital on January 12, 1930. Her physical examination was negative except for the pharynx, which was injected and the lungs, which showed occasional moist, coarse râles over the right upper lobe anteriorly. During the course of the disease she ran an irregular temperature, which never rose above 103°. The pulse, on the day after admission, reached 120, but, from then on, never rose above 110. The respirations were always below 30. The x-rays showed an area of consolidation in the right upper lobe. The patient made an uneventful recovery and was discharged on February 8, 1930.

Laboratory Findings—Urine and stool cultures were negative for typhoid, paratyphoid and dysentery groups. The blood serum was negative for undulant fever and melitensis. Thirteen sputum examinations were made, but showed only non-hemolytic streptococcus. About one week after the patient's admission mouse inoculations were made with the sputum. The mice died, but the death was not due to pneumococci. The white blood count was 7,600.

COMMENT

The outstanding points in these cases were:

1. The insidious onset (with the exception of Case 4)
2. The similarity to typhoid fever and, at the onset, to influenza
3. Pneumonia developing early in the disease
4. The slow pulse
5. The low white blood count
6. Constipation
7. No enlargement of the spleen
8. No rose spots

I wish to express my thanks to Dr. C. A. Stuart of the Biological Department of Brown University, to Dr. A. M. Burgess and to Dr. W. Pickles for their assistance.

TWO RATHER UNCOMMON FATAL CASES OF POISONING

BY W. W. FULLERTON, M.D.*

1. NITROBENZENE POISONING,—SUICIDAL
2. SODIUM FLUORIDE POISONING,—ACCIDENTAL

NITROBENZENE POISONING

THIS case is reported because of the rather unusual agent used for suicidal purposes.

A white male, aged 58 years was admitted to the Brockton Hospital, with a history of having, less than a half hour before, drunk an unknown quantity, out of a pint bottle, of a blackish green colored solution, with a strong alcoholic odor to the same. The bottle was brought with the patient, and was about half full when taken in charge. The man was admitted to the hospital at 1:30 P. M. and died at 2:30 P. M. the same day.

According to the history, mostly obtained from an elderly woman, this man was despondent and extremely nervous. He used to be a user of alcoholic beverages up to ten or twelve years ago. Since then he had used scarcely any. Just before the midday meal he went out of the room for a few moments and soon returned, with his hands to his abdomen, complaining of "great burning and distress in his stomach." He had "an abnormal dark grayish color." He refused to take emetics or epsom salts that the housekeeper tried to get him to take, and went and laid on a couch. In a few minutes he was so ill that help was obtained and he was taken to the hospital. Before going to the hospital he told the people at the house what he had taken and where to find the bottle, which he had hidden away lest the children should get it. This bottle contained a solution, a "stock solution" which was used for spraying trees, and also used in green-houses for fumigating plants.

At the hospital his stomach was washed out and a greenish colored material was brought up which had a very foul and nauseating odor. He was semi-conscious when admitted to the hospital and became comatose.

The autopsy as a whole was negative in the findings except those in the stomach and brain which showed a few changes. The mucous membrane in the cardiac portion of the stomach showed several small areas of ecchymosis, and a few similar areas along the greater curvature, otherwise the stomach was negative. The brain showed a moderate amount of edema, aside from this nothing unusual. The stomach contents, which were left in the stomach after the washings, were saved and sent to George E. Bolling, chemist of Brockton, Mass., for analysis. The fluid in the bottle was also taken and analyzed. The report showed that the contents of the bottle contained, grain alcohol 12.64%, by volume and nitrobenzene in considerable amount. No wood alcohol present. The stomach contents showed, grain alcohol 0.13% by volume present. Nitrobenzene was present. No wood alcohol present. Hydrocyanic acid and cyanides were absent in both the contents of the bottle and the stomach.

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SODIUM FLUORIDE POISONING

This case is reported because so few cases of fatal poisoning by this chemical are on record:

A white male, 76 years of age, who "had not been sick for years" except that two or three years ago he had an operation for cataract on one eye. He could not see to read very well, but could with more or less difficulty make out headlines in newspapers.

About 10:30 A. M., as near as could be ascertained he went to the pantry to get some epsom salts, a package of which as he supposed was kept on a pantry shelf in the "usual place". He found the package and it was reported to me that the man said he had taken a teaspoonful of the contents, and swallowed it. (Presumably with water.) About 11:30 A. M. an hour later he was heard groaning in his apartment, and a neighbor went in and found him lying on the bathroom floor. He had vomited before the neighbor arrived and also afterward.

A physician arrived about 11:30 and the carton was shown him and written on it in lead pencil were the words "Sodium Fluoride, put with sugar for ants." He immediately telephoned to the place of purchase to know the antidote for the chemical. He was informed as he told me "There is no antidote and it is not poisonous, except in large doses." The doctor then prescribed sodium bicarbonate and said to call him later if no better. This doctor was not called again, but another was called who came about 4 P. M. and again at 7 P. M. The last physician told me the patient was in a condition resembling coma from between 4:00 and 5:00 P. M. until his death, which occurred at 10:40 P. M. the same day.

When found on the bathroom floor, he had vomited and defecated. He was placed in bed. He complained of cramps in legs and fingers and developed some difficulty in swallowing. He slept at intervals and moaned most of the time. There were no convulsions.

The half pound carton with its contents was taken to the chemist for analysis. He reported the contents to be sodium fluoride, containing no arsenic.

The symptoms related above are quoted as given to me as medical examiner. I did not make the observations. No autopsy was ordered by the District Attorney.

Fatal cases of sodium fluoride poisoning have been seldom reported and the general idea seems prevalent that it is not a fatal poison. Therefore I feel that attention should be directed to this drug because of the fatalities that have occurred,* thus keeping physicians and others on guard and not letting a case go by without proper treatment; this case evidently did not receive proper treatment, partly because of the belief that sodium fluoride is not a fatal poison. It would seem wise to put a "Poison" label on containers of sodium fluoride, as for other poisons.

*Baldwin, Jour. Am. Chem. Socy., 21, 517.

MEDICAL PROGRESS

PROGRESS IN PSYCHIATRY

BY ISADOR H. CORIAT, M.D.*

TWO of the outstanding events in American psychiatry within the last year, were the dedication of the New York Psychiatric Institute and Hospital in December 1929 and the First International Congress of Mental Hygiene held in Washington, D. C., during the first part of May 1930. Both these occasions brought psychiatrists and psychoanalysts from all parts of the world and the papers presented summed up the various social, clinical and analytical aspects of present day psychiatry. The purely descriptive aspects of the clinical symptoms of the various psychoses were practically absent at both these gatherings, as the attention of psychiatrists through the influence of psychoanalysis, is becoming directed more and more to the meaning of the symptoms and their setting in the patient's life history and personality traits. At the International Congress of Mental Hygiene, a distinguishing feature which was frequently commented upon, was the influence of psychoanalysis upon the evolution of mental hygiene and the ever-increasing gap between psychoanalysis and the older academic psychology which was evident in many of the discussions.

At the dedication of the Psychiatric Institute, the papers presented were general surveys of the recent trends in psychiatry and comprised such varied subjects as the relationships between mind and body, the mechanism of hallucinations, psychoanalysis and psychiatry, the genesis of catatonia, psychiatry and the criminal law, psychiatry and the medical student, the architecture of the cortex, the mental endowments of genius, etc. The reader who is interested in these subjects, can be referred to the *Psychiatric Quarterly* (Vol. IV, No. 1, January 1930), where the papers and proceedings are published.

At the International Congress of Mental Hygiene, the papers were still more varied, so much so that even a mere cataloguing of the subjects would exceed the scope of this review. They comprised the general subject of mental hygiene in its manifold aspects, child guidance work, the work of psychiatric hospitals and clinics, the organization of community facilities for the prevention, care and treatment of mental diseases, besides several papers on the contributions of psychoanalysis to psychiatry.

From the reference standpoint, the recent excellent "Psychiatric Word Book" (a lexicon of terms employed in Psychiatry and Psychoanalysis) by Dr. Richard Hutchings can be highly recommended. The comprehensive Index (Volumes I to X) of the *International Journal of Psychoanalysis* is a detailed piece of work of great value to psychiatrists and admirably supplements the Index Psycho Analyticus issued in 1928.

As an outstanding contribution to what may be termed the analytical approach to social problems, which of late has proven so important for psychiatry, there appeared this year Freud's "Civilization and its Discontents." (English translation. The Hogarth Press 1930.) This work is brilliant and yet written in the clear manner so characteristic of all Freud's work, its scholarship is profound without being pedantic and with his unerring insight, Freud probes the sore spots of our present day civilization, which are so important for any clear understanding of the neuroses and psychoses.

Another work of importance for psychiatry is Alexander's "The Psychoanalysis of the Total Personality" (New York and Washington 1930). In this work the author applies Freud's newer metapsychological formulations to the problems of the neuroses, particularly to the mechanisms of self-punishment from the death instincts, as a factor in various psycho-neurotic symptoms. The reviewer has also applied these concepts to different neuro-psychiatric problems as they are met with in clinical work. (*Int. Journal Psychoanalysis*, Vol. XI, Part 1, January 1930.)

SCHIZOPHRENIA AND PSYCHOTHERAPY

It is pointed out by Brill (*American Journal of Psychiatry*, Vol. IX, No. 3, Jan. 1929) and this is in accord with the present trends in psychiatry, that the hopeless prognosis which formerly accompanied the diagnosis of Kraepelin's dementia praecox as a deterioration process, is now undergoing a marked change. The inexorable praecox issue of the Kraepelinian concept is assuming a more liberal and comprehensive attitude as the dynamics of the disorder are being better understood, particularly through analytical interpretation and also the psychobiological formulations of Adolf Meyer. There are a number of mild or early cases of schizophrenia seen in private practice who remain accessible for psychotherapeutic treatment because they have not completely renounced the outer world. Of course the difficulties in treatment must be met by various modifications in the analytical technique, quite different from the handling of hysterical or obsessional symptoms. The author is of the opinion that only those acute schizophrenics who cannot be kept at home should be sent to a hospital or sanitarium and

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should remain there only until the acute process subsides. Of course this procedure is possible in only a few selected cases. The hospital physician should attempt to understand the difficulties with which the schizophrenics are struggling, and not interpret their behavior, productions or delusional or hallucinatory phenomena, as shallow and meaningless. Even after the acute stage has subsided, these patients need guidance for long periods, the same as the internist guides his nephritic or cardiac patients.

BASAL METABOLISM AND EMOTIONAL STATES

In a study on this important subject (*Journal of Nervous and Mental Disease*, Vol. 70, No. 6, Dec. 1929), Dr. George W. Henry draws the following conclusions:

(1) There is a definite relationship between basal metabolic processes and emotional states regardless of the clinical type of personality disorder.

(2) Elated, overactive, and overtalkative states are accompanied by acceleration of basal metabolic processes.

(3) Depressed, underactive and undertalkative states are accompanied by retardation of basal metabolic processes.

(4) Apprehensive, tense, and agitated states usually imply an acceleration of basal metabolic processes, but this may be counteracted in some cases in which the feeling of depression is intense.

(5) Apathetic states are accompanied by a retardation in basal metabolic processes, which is not so great, however, as that associated with feelings of depression.

(6) It is probable that some of the so-called normal variation in the metabolic rate is due to the different emotional states presented by the tested individual.

(7) The basal metabolic rate may be altered to a pathological degree with no other apparent factor than an unusually intense emotional state, and therefore the interpretation of the rate in any given case, regardless of the type of illness, requires the consideration of the prevailing emotional state of the individual tested.

As showing the recent interest in the subject, two other papers may be cited. Goldwyn (*Archives of Internal Medicine*, Vol. 45, Jan. 1930) in a paper on the effects of hypnosis on basal metabolism, concludes that the basal metabolic rate was decreased under hypnotic suggestions tending to produce mental and physical inactivity. Whitehorn, Lundholm and Gardner (*Am. Journal of Psychiatry*, Vol. IX, No. 4, Jan. 1930), state that the mood of anxiety or apprehension, hypnotically induced, can increase the metabolic rate, but moods of depression, elation and irritability do not produce any certain increase.

PERSONALITY FACTORS IN ALCOHOLISM

As a result of the study of thirty cases of alcoholism (*Archives of Neurology and Psychiatry*, Vol XXIV, No. 1, July 1930), Dr. Henry H. Hart points out that the strong impulse to drink which develops into an irresistible craving can be understood only from the psychobiological viewpoint, namely as a reaction on the part of the individual to an environmental situation. The deeper personal needs which express themselves in alcoholic sprees or in chronic tippling are difficult to understand, as they frequently are concealed beneath a mass of rationalizations and deceptions.

For a comprehensive understanding of the underlying factors in the causation of alcoholism, a detailed study of the childhood is indispensable. The sexual life of the patients studied showed gross disharmonies and difficulties of adjustment. Eleven of the thirty cases studied revealed homosexual tendencies and in many of the cases there was a marital maladjustment due to a general constitutional deficiency, partly inherited and partly acquired through unfortunate childhood influences and training. This rendered the patient incapable of adjusting himself to the responsibilities of adult life and of society in general. Many of these patients were egocentric and egoistic. In many of these patients too, the cyclothymic personality was found more frequently than the schizoid type.

As a result of his studies, the author concludes that there can be derived a composite pattern or type which is common to most alcoholic patients. These are constitutional irritability, irresponsible early training and a cyclothymic personality which is exposed on all sides to the opportunity of alcoholic oblivion. The impulse to drink is a method of escape from the unpleasant relations and situations which the personality has precipitated. In some cases the alcohol seems to be a definite substitution for sexual satisfaction, because of the diminished libido.

(It seems that alcoholism has deeper components in the unconscious mental life than pointed out in this study. Alcohol is used as a means of enabling the ego to escape from reality. In an alcoholic spree the patient often regresses in his behavior to a very early period of infancy, in other instances the alcohol is utilized for the purpose of bringing into action the homosexual trends which under normal conditions are subject to repression. In those cases where a suicidal attempt is made during an alcoholic debauch, this can be interpreted as an emergence of the death instinct, a mechanism which is so often seen even in the non-alcoholic benign depressions. The alcoholic problem is a very complicated one, as certain personality types are able to solve their inner conflicts only by the use of alcohol or some other narcotic poison and consequently these cases can be understood in their deeper motivations only by the psychoanalytic approach. In a paper published in 1908, Dr.

Karl Abraham pointed out that men turn to alcohol because it gives them an increased feeling of manliness, that alcohol removes sexual repressions and also destroys the sublimations of the sexual instinct. External factors such as social influences, faulty education and hereditary taint are not by themselves sufficient to explain drunkenness, but an individual factor must be present and this can only be understood through a psychological investigation.)

SCHIZOPHRENIA AS A REACTION-TYPE

In a paper by Dr. Leslie B. Hohman (*Archives of Neurology and Psychiatry*, Vol. XVI, May 1929), he discusses the various theories of schizophrenia as formulated by Kraepelin, Bleuler and Adolf Meyer. On the basis of case material to illustrate these various viewpoints, he makes the following summary:

The first (Kraepelin) represents an attempt to explain a group of cases as a disease entity: it rejects psychobiological facts as irrelevant and meaningless. The second (Bleuler) admits the rôle of mental factors, but assigns to them a secondary place—the first place going to a hypothetic alteration of the brain or a toxin. The third view (Meyer) takes into account all the factors of a life, views them, so far as possible, as if they were a scientific experiment or causal sequence of events: gives due credence to any lesion of the brain or symptoms when a lesion of the brain exists, but utilizes the knowledge of more complicated psychobiological integrations and reactions as factors which do exist and function, and which have scientific validity. It points the way to an experimental attitude and a rational therapy. It provides a place for organic etiology, if this type of etiology can be discovered or demonstrated, but it refuses to accept a fatalistic attitude based on insufficient or nonexistent facts, with neglect of an etiology of a definite and valid sort. It reclaims for the realm of science human experience and the psychobiological forces that go to influence it.

THE PUERPERAL PSYCHOSES

In three papers relating to the psychoses of the puerperal period, Dr. Gregory Zilboorg has discussed the subject from the modern viewpoint. The problem of postpartum mental disorders is of very great antiquity and it is only within recent years that they have been dynamically understood. This viewpoint should be emphasized in order to get away from the loose diagnostic term of "puerperal mania" which is so frequently used in describing the condition. In the first of these papers on malignant psychoses related to childbirth (*The American Journal of Obstetrics and Gynecology*, Vol. XV, No. 2, Feb. 1928), the following conclusions are drawn as procedures for an investigation of the puerperal psychoses.

It would appear from this study that there are some factors, which permit one to gauge the chances of the woman a little before she becomes definitely compromised. Thus, the following procedure suggests itself:

1. A careful study of the prospective mother's personality or "make-up". A schizoid personality is open to suspicion.

2. A careful study of the prospective mother's psychosexual development, i.e., her interest in or reaction to the opposite sex: her attitude towards her partner, etc. An aloofness, a shyness in the presence of men, courtships lasting several years, and persistent frigidity in marriage, are danger signs and should make one definitely cautious. It is interesting how constant a manifestation frigidity is in our cases. The greatest majority of them marry after prolonged courtships, and usually in the latter part of their third decade of life. Among those who have married earlier, at the age of nineteen or twenty-two, for instance, we usually find also a history of a certain degree of compulsion: thus one of our cases married at twenty-two, because her mother insisted; another refused to marry, and the night before the wedding, she was sleepless and full of protest against the step, but here again, the future patient gave in to the insistence of a domineering mother.

3. If a woman of schizoid type has survived one pregnancy without apparent complications, a careful inquiry into her postpartum reactions is strictly indicated: for as has been pointed out by Ripping, primiparae are more apt to show early pathologic changes during the period of pregnancy, while postpartum, i.e., puerperal psychoses and psychoses during the period of lactation are more apt to be found among multiparae.

It might bear repetition to state that these suggestions are in the nature of an outline for further study rather than definite conclusions: for in order to corroborate some facts and refute the significance of others, one is in need of a control group of a number of normal women, whose personalities and psychosexual reactions could be studied and compared with those of the psychotic women. The psychiatrist unfortunately seldom has the opportunity to study the normal woman.

In a second paper on the postpartum schizophrenias (*Journal of Nervous and Mental Diseases*, Vol. 68, No. 4, Oct. 1928), an analysis is given of the underlying mental mechanism which is responsible for the psychosis and of which childbirth is only a precipitating factor.

It is noteworthy that the greatest majority of postpartum mental disorders occur in multiparae rather than in primiparae. Among the latter, as in the first case cited, one finds ample evidence of what Karen Horney calls "clinging to the phantasy of real love relationship with father," while the multiparae show it much

less and almost always present a history of one childbirth followed by a long period of sterility (five or ten years) or birth control, this period usually being characterized by the woman's withdrawal from feminine family interests; the schizophrenic psychosis usually sets in after the birth of the second, rarely the third child.

General and inferential as the evidence is and tentative as the formulations are, the following definite conclusions seem to be justified:

Postpartum schizophrenias are analytically quite understandable. We deal here with the castration complex of the revenge type, which is intimately combined either with an unresolved, positive Oedipus situation, or with its anal regressive resultant father identification. These factors present a number of phenomenological characteristics which are detectable long before the psychotic compromise is struck. Childbirth appears to be the nodal point of the conflict and the causative agent of the psychosis. As compared with other potential schizophrenics, the woman who is destined to develop a postpartum schizophrenia by her adherence to cultural demands, which is a part of the super-ego system, is able for a longer period to resist the disharmony between her ego and her more basic trends. However, her capacity for striking a compromise between her unconscious strivings and powers of repression is seldom sustained beyond one pregnancy, even if that pregnancy ended in a stillbirth.

These facts have important bearing upon the problems of psychoanalytical prophylaxis.

A third paper on the dynamics of schizophrenic reactions related to pregnancy and childbirth (*American Journal of Psychiatry*, Vol. VIII, No. 4, Jan. 1929), summarizes the previous work and suggests some new psychodynamic considerations.

The practical importance of differentiating the postpartum schizophrenias from the rest of the schizophrenias is more than of purely academic importance. The study of these reactions sets forth a problem of mental hygiene, giving to the latter some criteria for the estimation of the woman's psychobiological capacity, which might be applied before she enters a severe psychosis.

It would lead us too far afield if we embarked now upon a discussion of the practical details of the various methods of approach, which might be applied in the prophylactic treatment of women, who are destined to develop postpartum schizophrenias; this, however, may be said in conclusion:

Too little attention has been paid to the importance of sexual frigidity in women. The sexually frigid man is biologically well protected: he becomes impotent and thus avoids what he wishes to avoid. Moreover he considers impotence an illness and usually wants to be treated for it. The prevalent traditional opinion with regard to women is that they are usually frigid; that it is not an illness and that they will "get over it"; if they do not get over it, however, they are not relieved by society from the necessity of functioning biologically as if they were not frigid, i.e., not impotent. If we bear in mind that amongst the frigid women, there are a number of potential postpartum neurotics and psychotics and that frigidity is a common expression of a number of psychodynamic constellations, some of which are benign, some ominous, we might perhaps find a new and fertile soil for successful prophylactic results.

(In a paper by Ferenczi, entitled "Disease or Patho-neuroses," he suggests that the so-called puerperal psychoses are not to be traced to "infection," or to ordinary "excitement," but probably to the unavoidable injury of the central erotogenic zone at parturition.)

PROLONGED MANIC EXCITEMENTS

In a comprehensive study of the prolonged manic psychoses, Dr. F. I. Wertham (*American Journal of Psychiatry*, Vol. IX, No. 1, July 1929), the following summary of the author's investigations and experiences are given:

1. An historical survey of the literature bearing on prolonged manic excitements, has established that fully described cases of prolonged manic excitements are scarce (some are to be found in the literature on "late recoveries") and that there is little agreement among different authors as to the nature, outcome, and clinical evaluation of these conditions. The view seems to prevail that there are conditions of "chronic mania" which are essentially incurable; that other cases of prolonged manic excitements are in every respect the same as acute manic attacks; that still other prolonged excitements of manic nature really belong to the schizophrenic group.

2. Six cases of prolonged manic excitement of from five to eleven years' duration are reported. Four of these patients had either previous or subsequent manic attacks: in two patients the prolonged excitement was the only attack: no patient had depressive attacks, either before or after the prolonged excitement. One patient had two attacks of prolonged manic excitement, each of six years' duration.

3. As to the outcome of the prolonged attack; three cases recovered; two cases died during the attack (one from heart disease, the other as the result of an accident); one is still sick. The three recovered cases had later manic attacks.

4. The onset of the prolonged attack occurs in mature or advanced age; in four cases at fifty or over (fifty, fifty-one, fifty-eight, and sixty); in one at thirty-eight; and in one at thirty-four.

5. The premorbid personality of the six cases showed a positive charge in mood and activity; they were very active and persistent, talked a great deal, had many friends, were ambitious and of a jolly, optimistic nature. The first patient was of definitely hypomanic temperament,

and in his development showed a similarity to the cases described by Nitsche as "progressive manic constitution".

6. All cases were free "growth disorders". In only three cases was the anthropological type ascertained; all three belonged to the pyknic type (Kretschmer) in its most pronounced form.

7. After prolongation of the manic psychosis the patient tended to show:

(a) A more and more marked tendency to fluctuations, with relatively quieter periods intervening.

(b) A reduction in overactivity and intellectual productivity with tendency to a certain monotony and automaticity.

(c) Appearance of delusional ideas, transient and impressing one as showing a diminution of intellectual discernment.

8. The patients of this study after years of profoundly psychotic behavior preserved well the integrity of their personality and showed very little or no diminution of their intellectual and affective faculties.

9. Conditions favorable to the occurrence of prolonged and manic attacks are: The existence of a manic constitution combined with what may be termed an increased "psychobiological rigidity".

The existence of a manic constitutional element in these cases is evidenced by (1) the recurrence of manic attacks with absence of depressive attacks: (2) a "positive charge in mood and activity," which Ewald speaks of as "high biotonus".

Manic attacks occur in individuals with a certain rigidity of the whole personality. There seem to be three factors which alone or in conjunction with one another bring about or increase this psychobiological rigidity.

(A) Onset at maturity or advanced age. The importance of the age factor in the development of prolonged manic attacks is also borne out by the fact that a relatively considerable number of prolonged manic attacks is recorded in the literature on mania of advanced age.

(B) Evidence of characterological rigidity in the premorbid personality. This was noted in five of the six patients.

(C) Pronounced reduction in intellectual equipment. That was noted in two patients.

10. A seventh case of prolonged manic excitement is reported which represents a transition of the group of chronic manic excitements of circular type. This patient had one previous depression; the age of onset was relatively early (thirty-one), he was emotionally very unstable as a child, and in the course of the psychosis the elation became less continuous and there was an alternating course with periods of mild depression between the states of excitement.

11. In a series of manic attacks of 1000 male and 1000 female recovered manic-depressive patients who were first admissions to the New York civil State Hospitals, the variation in the duration of manic attacks, the frequency of chronicity and the relationship between age and duration of the attack were studied.

(a) *Duration*—The duration period in which the largest number of cases occurs is about 120 days (4 months). The average duration of all manic attacks was 241.7 days (34.5 weeks). There is a continuous decline in the number of cases as the duration increases, from 120 days on. The decrease is steady and gradual until the duration of about one year and ten months is reached; from then on the cases are very infrequent. The distribution according to duration of attacks in male and female patients is very similar to the distribution of the combined group.

(b) *Frequency*—There is a slight preponderance of chronic attacks in women. The frequency of cases with a duration of over five years, the group to which belong the cases of this study, as compared with the frequency of cases with shorter duration, is about eight pro mille.

(c) *Age*—The average age at admission of the 2000 cases is thirty-two years. The peak of the distribution according to age is between twenty and twenty-five. Then the curve decreases rapidly and steadily as the age periods increase.

12. There is a definite biological correlation between age and duration of first admissions of manic patients. This is illustrated by frequency polygons showing the distribution of cases according to age, and by a comparison of the average ages of the duration groups. The average age of admission of the group with duration under one year is thirty-one years; that of the group with duration of five years and over is forty years. This statistical result confirms the conclusion derived from the clinical study of the prolonged manic excitements here reported, that age is one of the most important demonstrable factors entering into the development of prolonged manic excitements.

13. There are evidently different groups of psychoses with prolonged manic excitements. The group isolated and described as cases of benign chronic psychoses has distinct constitutional and clinical features and may serve as a point of orientation for further investigation of prolonged excitements in affective psychoses and of chronic excitements in general. Practically, its recognition is of importance because these cases are frequently wrongly interpreted. On account of the long duration, the intense outbursts on paranoid lines, the great impulsiveness and the contrary attitude, the patients are apt to be diagnosed as paranoid psychoses, as schizophrenic psychoses, as paraphrenia, or as involutional psychoses of unfavorable type.

14. From the study of this material and from

scattered cases recorded in the literature, it seems possible to single out a distinct group of benign chronic manic excitements which consists of infrequent cases arising on the foundation of a manic constitution with a tendency to recurring acute manic attacks, and affinity to the pyknic body type, a tendency to the onset of a chronic condition in mature or later life, absence of depressive attacks or circular phenomena, reduction in the manic overactivity with tendency to fluctuation, absence of pronounced signs of deterioration and a potential possibility of recovery from the chronic attack.

(In the attached bibliography to this paper, the author refers to a contribution by Dr. Karl Abraham (1912), in which he states that "the onset of mania occurs when repression is no longer able to resist the assaults of the repressed instincts," and where the patient, especially in cases of severe maniacal excitement, is swept off his feet by these instincts. In fact the manic patient shows that he has become free from the object or situation which caused his former depression.)

PSYCHIATRY IN GENERAL HOSPITAL PRACTICE

Dr. George W. Henry (*American Journal of Psychiatry*, Vol. IX, No. 3, Nov. 1929), made a comparative study of a group of ward cases representing three hundred psychiatric consultations and drew the following conclusions.

In so far as it is possible to arrive at any definite data from the varied experience with the psychiatric problems in the wards and out-patient clinics of general hospitals the following conclusions seem justified:

1. Every general hospital should have a psychopathic department and at least one attending psychiatrist.

2. Except in emergencies no eccentric or neurotic individual should be submitted to an operation or started on a prolonged course of treatment without psychiatric consultation.

3. No medical student should be permitted to graduate without having taken a course in the psychiatric aspect of general hospital practice.

4. A period of study in a psychopathic hospital should be part of all hospital interneships.

5. In giving psychiatric instruction the emphasis should be placed upon the less obvious disorders which so frequently complicate general medical and surgical practice, while the well-developed psychoneuroses and frank psychoses should be studied chiefly for the purpose of giving perspective.

6. All staff conferences in general hospitals should be attended by the psychiatrist so that there might be a mutual exchange of medical experiences and frank discussion of those cases in which there are psychiatric problems.

In a paper by Dr. C. Macfie Campbell (*Psychiatric Quarterly*, Vol. IV, No. 1, January 1930), the allied problem of psychiatry and the medical student is discussed. It is pointed out, that Medical schools are today laying more emphasis on psychiatry and upon the training of physicians to meet the psychiatric needs of the community, thereby orienting the student to a more scientific attitude towards mental disorders.

PSYCHE AND PSYCHOID

This paper by Professor Eugen Bleuler (*The Psychiatric Quarterly*, Vol. IV, No. 1, January 1930) is an attempt to formulate a scientific conception on the relationship existing between the mind and body. In order to understand his patients, the psychiatrist must be thoroughly acquainted with both their psychical and physical conditions. Diseases that are called "nervous" are usually disturbances emanating from emotionally-laden ideas. There are an endless number of experiences which prove a close relationship in the nature of somatic and psychical processes. The bodily functions can be brought under one conception which Bleuler terms the "psychoid" and the mind is a specialization of the psychoid of the organism. This comprehensive paper is so thought provoking that it must be read in full in the original.

(This concept of mind as formulated by Bleuler somewhat resembles Freud's theory that the ego is ultimately derived from bodily sensations.)

SCHILDER'S DISEASES

In 1912 Schilder (*Zeit f.d. ges. Neurologie and Psychiatrie*), described a certain type of sclerosis of the brain as "encephalitis periaxialis diffusa" and grouped under this heading a number of cases which showed more or less similar neuropathological findings. In a paper on this disease by T. Grainger Stewart, J. Godwin Greenfield and Marjorie A. Blandy (*Brain*, Vol. 50, Part 1) three cases of this disease are described both clinically and pathologically. In the differential diagnosis between Schilder's encephalitis and disseminated sclerosis, the chief clinical criteria were loss of hearing and a progressive and complete loss of vision and on the pathological side the symmetrical and diffuse nature of the demyelinated areas and the destruction of the axis cylinders in them at an early stage, thus distinguishing this disease from disseminated sclerosis.

(The chief symptoms of this uncommon disease which usually attacks children and young people, are blindness, mental impairment and progressive spastic paralysis. The onset is sudden and the course usually progressive. Its pathogenesis is obscure. Pathologically it is an inflammatory disorder affecting the white matter of the cerebral hemispheres, with primary destruction of myelin and later of the axis cylinders and overgrowth of neuroglia. In addition to the visual disturbances, sometimes associated with optic neuritis, other special senses may be in-

volved (smell, taste, hearing), epileptiform attacks, ataxia, disturbances of speech, diplopia, nystagmus, progressive spastic paralysis and mental symptoms in the form of apathy and progressive deterioration. The disease is progressive and terminates fatally.)

FUNCTIONAL PSYCHOSES IN CHILDHOOD

A study of the functional psychoses in childhood was undertaken by Dr. Jacob Kasanin and Dr. M. R. Kaufman (*American Journal of Psychiatry*, Vol. IX, No. 2, Sept. 1929), with the hope that a clearer idea might be obtained of the early factors in the development of a mental disease. For this purpose these investigators selected all the children under sixteen years of age who were admitted to the Boston Psychopathic Hospital during the three years 1923 to 1925 inclusive. Out of a total of about 6000 admissions, only 160 were children (92 boys and 68 girls) and of this group only sixty-five cases were diagnosed as psychotic, the remainder belonging to various types such as psychopathic personality, conduct disorder or mental deficiency.

Psychoses in children are relatively rare. Of this group the most frequent diagnoses were schizophrenia (21 cases), manic-depressive insanity (4 cases), epilepsy (4 cases), encephalitis (13 cases). The scope of this investigation was limited to schizophrenia and manic-depressive insanity.

The children diagnosed as manic-depressive psychoses did not necessitate any change in the diagnoses. Of the schizophrenic group, six cases were typical, five had reactive psychoses, in two a schizophrenic reaction was engrafted on an original mental defect, two cases each were either hysterical reactions, atypical or psychopathic personalities or toxic psychosis, one was a traumatic psychosis and one case was undifferentiated. The outcome of these cases was varying; two died, seven at the time of the investigation were still patients in state hospitals, and sixteen returned to the community. The toxic and typical schizophrenic cases were the most ominous in prognosis.

The physical factors were of significance only in a few cases. Heredity was definitely poor in the clear-cut cases of schizophrenia and the affective disorders. In many of the cases the family situations were unusual, beginning in early infancy. Sex with its various problems played a most important rôle, as many of the cases developed their psychoses at puberty, a very critical period in psychosexual development and in the formation of new adaptations. Environmental stress in its various forms was of definite etiological significance.

As bearing on this subject, attention may be called to the analysis of a four year old schizophrenic, in a paper by Melanie Klein. (*Int. Journal Psychoanalysis*, XI, 1, 1930.) It is pointed out that schizophrenia is much commoner in childhood than is usually supposed for the following reasons:

Parents, especially in the lower classes, mostly consult a psychiatrist only when the case is desperate, that is, when they can do nothing with the child themselves. Thus a considerable number of cases never come under medical observation. In the patients whom the physician does see, it is often impossible for him in a single rapid examination to establish the presence of schizophrenia. So that many cases of this sort are classified under indefinite headings, such as "arrested development," "mental deficiency," "psychopathic condition," "asocial tendency," etc. Above all, in children, schizophrenia is less obvious and striking than in adults. Traits which are characteristic of this disease are less noticeable in a child because, in a lesser degree, they are natural in the development of normal children. Such things, for instance, as a marked severance from reality, a lack of emotional rapport, an incapacity to concentrate on any occupation, silly behavior and talking nonsense do not strike us as so remarkable in children and we do not judge of them as we should if they occurred in adults. An excess of activity and stereotyped movements are quite common in children and differ only in degree from the hyperkinesis and stereotypy of schizophrenia. Automatic obedience must be very marked indeed for the parents to regard it as anything but "docility". Negativistic behavior is usually looked upon as "naughtiness," and dissociation is a phenomenon which generally escapes observation in a child altogether. That the phobic anxiety of children often contains ideas of persecution which are of a paranoic character and hypochondriacal fears is a fact which requires very close observation and can often be revealed only through analysis. Even more commonly than psychoses we meet in children with psychotic character-traits which, in unfavorable circumstances, lead to disease in later life.

Thus, fully developed schizophrenia is more common and, especially, the occurrence of schizophrenic traits is a far more general phenomenon in childhood than is usually supposed. For this reason the concept of schizophrenia in particular and of psychosis in general as occurring in childhood must be extended, and one of the chief tasks of the children's analyst is to discover and cure psychoses in children.

The theoretical knowledge thus acquired would doubtless be a valuable contribution to an understanding of the structure of the psychoses and would also help to reach a more accurate differential diagnosis between the various diseases.

PSYCHOANALYSIS AND PSYCHIATRY

In a brilliant paper by Dr. Ernest Jones (*The Psychiatric Quarterly*, Vol. IV, No. 1, Jan.

1930), the chief points of the relationship between psychoanalysis and psychiatry may be conveniently summarized as follows: The relationship of psychoanalysis to psychiatry resembles that of histology to anatomy. The addition to psychiatric knowledge through a detailed study of the finer content of mental processes through the purely interpretative side of psychoanalysis, the revealing of the latent content of dream and delusions, is relatively unimportant in comparison with the illumination psychoanalysis has thrown on the more vital problems of motivation and psychogenesis. In other words it explains not only what has happened but also why it happened, and as such has yielded knowledge of inestimable value for psychiatry. One of the most startling discoveries of psychoanalysis is that most of the phenomena comprising a mental disorder are symptoms and indications not so much of disease as of a healing process, such as in the delusions of the paranoiac, the phobias of hysteria and the obsessions of an obsessional neurotic. This viewpoint has important therapeutic as well as pathological bearings. The disorder underlying all mental morbidity can be defined as failure on the part of the ego to deal in any final manner with certain fundamental intra-psychical conflicts. The ego, which is the kernel of the personality, on the integrity of which all mental health depends, has two essential tasks to perform and two corresponding difficulties or dangers with which to cope. It has to assimilate and to respond adequately to stimuli proceeding from two very different sources, i.e., the perceptions of the outer world and stimuli arising in the inner world and must bring these two sets of stimuli in some harmony with each other.

Profound alterations in mental functioning can be induced through toxins, but recent work on the psychology of paresis and of the alcoholic psychoses have shown that the mental manifestations of these disorders cannot be explained as the direct work of the toxins concerned, but are rather the expressions of individual conflicts which can no longer be coped with by an ego weakened by cerebral poisoning. The more stable the relation between consciousness and the unconscious, the less liable is the mind to be disturbed by toxins.

(Referring to the viewpoint that a mental disorder may be a healing process, rather than symptoms or indications of disease, Freud's famous analysis of a case of paranoia may be cited. (Collected Paper, Vol. III.) In summarizing the detailed analysis of this case, Freud states "The delusion formation, which we take to be a pathological product, is in reality an attempt at recovery, a process of reconstruction.")

PSYCHOPATHIC PERSONALITY

In a paper on the current conceptions of the concept of psychopathic personality (*American Journal of Psychiatry,* Vol. X, No. 1, July 1930) Partridge brings the fourth of his series of studies to a more detailed orientation.

In the first paper of this important group of the little understood, mentally-deviated individuals (*American Journal of Psychiatry,* Vol. VII, No. 6, May 1928), fifty discharged cases of psychopathic personality were studied. He concludes that three main types are distinguishable, the delinquent, the inadequate and the general incompatibility types. In almost every case of the series there was evidence of feelings of insecurity, inferiority or inadequacy, with a tendency to resort to one or more typical reaction-patterns, different in the various cases, but all included under the term tantrums, sulks or running away.

The second paper (*American Journal of Psychiatry,* Vol. VIII, No. 1, July 1928) was a report of an investigation of fifty boys in a training school for delinquents. These cases had been referred for psychiatric examination as particularly problematic. The various reactions of these cases did not represent any specific mental disorder, but the behavior difficulties were related to mental retardation or deficiency.

In a third paper on psychotic reactions in the psychopath (*American Journal of Psychiatry,* Vol. VIII, No. 3, Nov. 1928) these cases showed either a fairly wide range of reactions more or less related to a previous psychopathic maladjustment or a predominance of manic-depressive reaction types, while schizophrenic reactions were not clearly represented, but were apt to be atypical.

In the most recent contribution, it is pointed out that the current psychiatric views of psychopathic personality show a wide disparity and some degree of confusion, being utilized apparently to include all personality deviations. After an historical review of the subject and a discussion of the many terms used in the literature to describe the same type of individual who is subject to repeated misconduct, he is inclined to the descriptive classification of Schneider (1928). According to this classification there are ten types of psychopathic personality: hyperthymic, depressive, insecure, fanatic, self-seeking, emotionally unstable, explosive, affectless, weak-willed and asthenic. Kraepelin's classification appears less clearly differentiated and he groups these cases under the excitable, unstable, impulsive, eccentric, liars and swindlers, anti-social and quarrelsome types.

He considers that the type of "psychopathic personality" be called "sociopathic," and is best regarded as ranking with the functional mental disorders in general. To regard these as particularly personality diseases or disorders or even to make a sharp separation as non-psychotic, is very unwise in the present state of our knowledge. Further work might suggest a different term either dynamic or descriptive or a deeper exploration might lead to a redistribu-

tion of this class into newly discovered or even existent classes.

(When these various descriptive classifications are taken into consideration, it seems that the term "psychopathic personality" is rather meaningless. From the dynamic standpoint in the grouping of the varied symptoms, all such cases are anti-social, in other words they remain at the stage of infantile behavior and have not exchanged the ego-ideals of childhood for the ego-ideals of society. The psychopathic personality types are those in which the internal monitor of the mind or super-ego is weak, and for this reason, their aggressions and anti-social behavior are directed externally against all cultural prohibitions.)

THE WHITE HOUSE CONFERENCE

RAY LYMAN WILBUR, M.D.

Secretary of the Interior and Chairman of the White House Conference on Child Health and Protection

A little more than a year ago, President Hoover called the first meeting of the White House Conference on Child Health and Protection. The reports of the four sections of the Conference and their various committees and sub-committees are being gathered into a vast compendium of information to be presented to the Conference, as findings, when it convenes in Washington on November 19.

The work, as originally planned, has been carried on by four sections which have studied Medical Service and its relation to children; Public Health Service and Administration; Education and Training; and the Handicapped Child. But as the work has logically led the investigators into new and unexpected fields the orginal group of seven hundred experts has grown to eleven hundred trained workers whose enthusiasm and devotion have been a real source of inspiration to their leaders.

In carrying out the original purpose of the Conference, "to make a survey of our children, to study the forces influencing them, and to try to chart out the wisest courses possible in our future management of youths," the Conference has not confined itself entirely to the integration of existing information, but is carrying out through the agency of various committees several interesting pieces of original investigation. Among these is the Family Interview Survey conducted by the Committee on Medical Care for Children with the coöperation of the Department of Agriculture.

Altogether it is anticipated that about 50,000 records dealing with the use of medical service for preschool children will be secured from cities and the same number from rural areas. During recent years the problems of the preschool child have received more and more attention for we realize that during these years the foundation is laid upon which our school must build future citizens. Many of our children now reach school age with physical handicaps which might have been prevented or corrected by proper medical service. Why have they not been prevented or corrected? Does the fault lie with parents, with the inadequacy of available medical service, or the costliness of medical service? These are some of the questions which it is hoped may find their answer in the data collected and studied by this committee.

Many of the questions under consideration by the Conference are age-old, others are distinctly the by-products of our modern civilization, and some of the problems concern special groups. Physically and mentally handicapped children we have always had with us, and they must always have special care, but instead of deploring their fate and letting it go at that, we are beginning to make an effort to fit them into a scheme of life where their inadequacies will be minimized. And so it is good for representatives, from widely separated communities which have carried out constructive programs, to get together and talk over their problems and plans, and set newer and higher standards of care.

The problems of the urban child are receiving special attention for we realize that the increasing congestion of our cities is exacting greater and greater penalties, physical, mental and moral. How can we restore to the child the sunshine, the fresh air, the play space and the interesting tasks of which we have deprived them? How much as a nation, or as cities or as parents, can we afford to pay, to give them these things?

Viewed as an isolated fact the cost of a constructive program in medical service, education or recreation seems staggering when we add up the bill, state by state, and organization by organization, but in comparison with a national bill for sickness, or delinquency, or crime,—it dwindles. If the White House Conference on Child Health and Protection does no more than teach us to compare these values it will have made a great contribution to our national welfare.

CASE RECORDS
of the
MASSACHUSETTS GENERAL HOSPITAL

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED IN WEEKLY CLINICAL-PATHOLOGIC EXERCISES

EDITED BY RICHARD C. CABOT, M.D.
F. M. PAINTER, A.B., ASSISTANT EDITOR

CASE 16351

CRAMPS IN THE LEGS

MEDICAL DEPARTMENT

PRESENTATION OF CASE

DR. GILES W. THOMAS*: This patient was an albino girl of twenty who entered complaining of cramps in the legs of two and a half months' duration.

First admission. She had had two previous hospital entries, one for malnutrition in 1922, when she had no subjective symptoms at all. She showed nothing remarkable on physical examination except for a certain amount of pallor, horny keratosis of the skin and of the hair follicles. The blood pressure at that time was 120/85. Three urine examinations were negative except that at one there was the slightest possible trace of albumin. The blood showed non-protein nitrogen 39 milligrams per 100 cubic centimeters, creatinin 1.45, uric acid 4.90. No suggestion was made at that time of the possibility of renal involvement.

Second admission. The following year she was admitted for scabies. This was successfully treated and she was discharged after a short time. The urine showed a specific gravity of 1.028 at that time.

Third admission. Her third entry was May 24 this year, when she complained of cramps in the legs of two and a half months' duration. She was probably a little feeble-minded according to the social worker. That accounts somewhat for her inadequate history. Three months before entry she complained that she felt all run down, tired out. She kept on with her school work. Two and a half months before admission she noticed cramps in her legs coming on four or five times at night; nothing else. Eight weeks before entry her friends noted that she was very pale. Six weeks before admission she noted black specks before her eyes. Two weeks before admission she had a profuse nosebleed lasting two hours. She had nocturia three times at night and some swelling of the ankles and lower legs extending almost to the knees for the week preceding entry. She really felt sick beginning at that time.

Clinical examination showed a fairly well developed albino girl of twenty. Skin dry and scaly, with prominence of the hair follicles. Nystagmoid movements of the eyes characteristic of the albino. The iris was blue and the pupils pink. With the pupils dilated and a -20 lens a fairly large discrete hemorrhage could be seen in the right fundus and three or four small ones in the left. The heart was enlarged to the left. There was a very loud rough first sound followed by a blowing systolic murmur, a snapping second sound and a loud third sound at the apex. Aortic second markedly accentuated and ringing. Blood pressure 185/125. Reflexes active but not twitching.

A diagnosis of chronic nephritis and hypertension was made in spite of the inadequate history. It was not realized at the time that she was in as critical a condition as she was. She seemed cheerful, not at all stuporous; on the contrary she was very vivacious and entertained the ward for most of her stay in the hospital. The non-protein nitrogen was 137, practically a gradual rise until the end, when it reached 160. The red count on entry was 2,000,000. That gradually fell to 1,000,000. The creatinin, which was about 5 or 6 on admission, gradually rose to 10, and the CO_2 combining power fell on the day of death to 14.

Treatment in the first place consisted of limiting fluids at first to sixty ounces and after two days forcing them to 100 to 150 ounces without any particular effect. Many urine examinations showed a trace of albumin from beginning to end, with a few granular casts and occasional red cells. The renal function was less than 5 per cent. Two days before death transfusion was done, but no effect could be noted. The red count was lower than the previous count, but that had not been done for two or three days so we were not sure of that.

The night before she died she had a uremic convulsion which lasted five or ten minutes. By the time I reached the ward the violent convulsion had stopped. She was only occasionally twitching and breathing about 50 to the minute with very deep gasps, Kussmaul breathing. After she had been given about a grain and three-quarters of luminal intravenously she went to sleep. The next morning she was rational, could answer questions and was only moderately stuporous. She remained about the same until the late afternoon, when she fell into a deep stupor again. The blood report from the morning showed non-protein nitrogen 200 and CO_2 combining power 14. She was about to be given soda bicarbonate intravenously when she died.

DR. JAMES H. MEANS: Was the edema confined to the legs throughout the course?

DR. THOMAS: Yes.

DR. MEANS: Did she present the clinical picture of acidosis when she had this CO_2 of 14?

DR. THOMAS: Yes, she did.

*Recently senior interne on the East Medical service.

Clinical Discussion

BY RICHARD C. CABOT, M.D.

The presenting symptom seems to be cramps, which at once leads us to consider the ordinary causes of this complaint. Cramps as they occur in runners during an exhausting race or in tetany however produced, are presumably due to a disturbance of the acid-alkali balance in the blood. As there is reason to suspect nephritis in this case, and as nephritis is a disease which may disturb the acid-alkali balance, one suspects from the outset that the cramps are due to that cause. The visual disturbances, the nosebleed, the nocturia and the edema are to be similarly explained.

Hence we come to the physical examination with the tentative diagnosis of nephritis. This is supported by the finding of a retinal hemorrhage, by the cardiac enlargement and the other data concerned with the heart, by the high blood pressure, the high non-protein nitrogen and the grave anemia. The creatinin and the low CO_2 combining power further support this diagnosis, which should I think have been maintained even had the urine shown nothing abnormal. In fact, however, the condition of the urine is what one would expect. The convulsion at the end was doubtless of the type formerly called uremic.

From Dr. Means' second question it appears that the clinical picture of acidosis (presumably including a so-called air hunger with deep, regular, somewhat accelerated breathing) was present.

In the post-mortem examination one would expect chronic nephritis. There is nothing to indicate of what type this was, except the age of the girl, which points towards a chronic glomerular nephritis. There is also hypertrophy and dilation of the heart without valve lesions and passive congestion of the internal organs. This is the sort of case in which a terminal infection unsuspected during life is often found post-mortem, but if any such is present there is nothing in the history to suggest where it is.

CLINICAL DIAGNOSES

Chronic nephritis with hypertension.
Uremia.
Secondary anemia.

ANATOMIC DIAGNOSES

1. *Primary disease.*
   Chronic glomerular nephritis.
2. *Secondary or terminal lesions.*
   Hypertrophy of the heart.
   Interstitial pancreatitis.
   Albinism.

Pathologic Discussion

Dr. Tracy B. Mallory: The autopsy showed the usual findings of glomerular nephritis. The total weight of both kidneys was 110 grams. That is somewhere between a third and half of normal for a girl that size. When the capsules were stripped they showed a granular grayish surface. She had edema, a small amount of ascites and a moderate degree of hypertrophy of the heart, consistent with hypertension, which she may have had for a considerable period of time. One accidental discovery was a moderate degree of interstitial pancreatitis. There does not seem to be anything in the history to suggest that.

I think the striking thing about the case is that with such a very chronic lesion from an anatomic point of view the onset of symptoms and the progression at the end should have been so rapid and acute.

Dr. Fuller Albright: What is the pathology behind the albino? What makes the pupils pink?

Dr. Mallory: Total absence of melanin in the skin, retinae, iris and hair.

Dr. Albright: That is not associated with any internal secretion, is it?

Dr. Mallory: Not so far as I know. It is hereditary and behaves like a Mendelian recessive character.

Dr. Albright: So many endocrine disorders are associated, like Addison's disease, with pigment disturbances that one wonders whether there may not be some endocrine disorder in albinism, especially as Dr. Smith* produced albinism in tadpoles by removal of the pars buccalis of the pituitary.

*Smith, P. E. Pigmentary growth after ablation of pars buccalis. Wistar Inst., Mem. XI.

CASE 16352

EPISTAXIS IN A BABY THREE MONTHS OLD

Children's Medical Department

PRESENTATION OF CASE

Dr. Otto C. Yens*: A white girl three months old was admitted to the hospital March 1 with the complaint of nosebleeds for three days.

Family history. The father and mother were living and well. There had been three pregnancies, the first a girl now five years old and well, the second a stillbirth, the third the patient. There was no family history of bleeding. There had been cases of tuberculosis in the father's family, but the child had not been exposed to that disease.

Past history. The birth was at full term and the delivery normal. The birth weight was seven pounds twelve ounces. Over the lower body there was a patchy rash from which scars still remained.

*Recently interne on the Children's Medical service.

The child was breast fed, with occasional added feedings of a milk-water-sugar formula. She had gained normally in weight and weighed eleven pounds eight ounces on admission. Her only illness was a mild conjunctivitis at two weeks of age.

Present illness. For ten days the patient had had a head cold with a mucopurulent discharge. On February 26 a small amount of blood began to come from the right nostril. This gradually increased in amount. On February 27 her physician packed the nose. On February 28 blood dripped from the nose steadily for six hours. The doctor repacked the nose. That evening bleeding began again.

Physical examination. Temperature 101°. Pulse 160. Respirations 70.

The child was well developed and nourished. She was very pale and lay quietly. Her breathing was rapid and shallow. Bloody crusts were apparent about the nose and fresh blood was oozing. Radial scars were seen about the lips. The throat contained blood clots and was slightly injected. There was enlargement of all the superficial glands except the epitrochlear. The lungs were normal except for many transmitted râles from the nasopharynx. The heart was normal. The abdomen was distended and mildly tympanitic. The spleen was enlarged, extending below the umbilicus. The liver was felt to three fingers below the costal margin. A copper colored scaly and blotchy rash was apparent over the lower back and legs.

Laboratory findings. Blood: leukocytes 7,500, red blood cells 1,250,000, hemoglobin 20 per cent.

Course in the hospital. The nose was first packed with gauze moistened with adrenalin. Then a transfusion of the father's blood (120 cubic centimeters) was given. The blood of the patient and that of the father had been tested and found to be compatible. After a few hours the nose stopped bleeding. The child's temperature gradually rose to 107°. At 7 a. m. March 2 she died.

Wassermann reactions on the child, the mother and the father were subsequently reported to be positive.

Clinical Discussion

BY HAROLD L. HIGGINS, M.D.

The diagnosis of congenital syphilis here is quite evident. The family history of a stillbirth, the eruption present at birth which led to copper colored scars on the body, the rhagades around the lips, the bloody nasal discharge, the general glandular enlargement, and especially the very large liver and spleen, all point quite clearly to congenital syphilis.

The nutrition of the child was good, but that is not uncommon in syphilitic children who are breast fed.

A bloody nasal discharge in a child usually suggests four possible diagnoses, (1) congenital syphilis, (2) nasal diphtheria, (3) foreign body and (4) septal ulcer. In this case the bloody discharge was probably due to an ulceration caused by a syphilitic lesion of the mucous membrane of the nose. This ulcer may have eroded into a vessel, perhaps a small vein, leading to the extensive epistaxis. The bleeding does not seem to have been due to a purpura, as the platelets were found normal in number on a smear of the blood.

Treatment was first by packing the nose. When the nose of a small baby is occluded there is usually difficulty in breathing until he learns to breathe through his mouth. In a baby under three months of age snuffles may cause as much difficulty in breathing as laryngeal edema, except that in snuffles the difficulty disappears when the child cries. The child breathes well and has good color when he cries, but has difficulty when quiet. This patient had considerable difficulty in respiration with the packing in the nose.

Transfusion was resorted to because of the marked anemia, in hope of stopping the bleeding, and because the packing was causing distressing symptoms. The bloods were matched. It is necessary to match blood in transfusing a baby as young as this. I do not think that the child died as a result of transfusion with an incompatible blood. That type of death is usually characterized by marked sudden chill. Here the rise in temperature following the transfusion was gradual rather than sudden.

The immediate cause of death in a syphilitic child is frequently somewhat in doubt. The very high temperature in this case suggests some cerebral involvement in the neighborhood of the temperature regulating center. The syphilitic child is very subject to secondary infections. Possibly in this case there was a beginning pneumonia which was not detectable on physical examination. The child died within twelve hours after admission to the hospital. It is not uncommon for young syphilitic children to die after a slight surgical procedure, as occurred with this patient.

Clinical Diagnoses

Acute epistaxis.
Congenital lues (?).

Anatomic Diagnoses

Congenital lues.
Bronchopneumonia.

Pathologic Discussion

Dr. Merrill J. King: Autopsy confirmed the clinical diagnosis of congenital lues.

The most significant changes are in the liver, which had a peculiar opaque yellowish color with some obscuring of the normal markings. Microscopically the normal lobulation is absent, there is a marked diffuse fibrosis and the hepatic cords are replaced by short strands of liver cells. There is also a slight lymphocytic infiltration of the stroma.

The lungs were negative grossly except for a small patch of consolidation at the right base. Histologic examination shows a moderate amount of atelectasis in some foci. The bronchi show considerable lymphocytic infiltration of their walls. An occasional alveolus is filled with endothelial leukocytes. One section of the lower right lobe shows a bronchus and the corresponding alveoli packed with red cells. This probably resulted from aspiration during an epistaxis.

The spleen was markedly enlarged, firm, smooth, purplish. The cut surface showed very prominent Malpighian corpuscles. Sections show the sinusoids to contain many megakaryocytes and numerous premature bone marrow cells, among which are myelocytes. The kidneys also contain small foci of hematopoiesis. These hematopoietic changes are what one would expect to find in such a case of congenital syphilis.

Silver stains of the tissues have not been completed as yet.

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WHERE DOES THE RESPONSIBILITY FOR THE INCREASING MORTALITY OF APPENDICITIS LIE?

IN the statistical bulletin of the Metropolitan Life Insurance Company for July, 1930 the statement appears that "in the nineteen years since 1911 a steady upward trend in appendicitis rates has been observed among Metropolitan policy holders. The year 1929 had one of the highest appendicitis death rates on record."

Further facts are brought out to the effect that in the last five year period of the past nineteen years the percentage of deaths due to appendicitis has increased over the first five year period of these years by twenty per cent. for males and fourteen per cent. for females. This increase is found especially in the age group under five years where among male children the increase is one hundred and twenty-six per cent. and in white females ninety-two per cent.

There is however a slight decrease in the age period between ten and fifteen years. Beginning with adult life the increased death rate rises with age.

In these statistics the generally accepted statement that appendicitis is responsible for higher death rate among males than females is supported.

With more than eighteen thousand deaths in this country due to appendicitis and an increasing mortality rate, there is abundant reason to ask qualified investigators to concentrate on the problems inherent in this menace.

When Reginald Heber Fitz first made clear the pathology of appendicitis and the therapeutic resources of surgery were brought to bear on the disease with brilliant results, this very common cause of fatal peritonitis was regarded as another illustration of the surrender of one of the enemies of the race to scientific medicine.

But now there seems to be a recrudescence of the malignancy of this disease and if the increasing mortality is the result of faulty management either by procrastination on the part of patient or doctor, or dietary habits which tend to increase the virulence of intestinal bacteria, the etiology should be determined and educational propaganda employed.

The treatment of appendicitis is practically standardized among qualified surgeons and it is unlikely that the trouble lies in this field and although alleged appendicitis has been exploited to a discreditable extent by the sins of surgical pretenders, the question arises as to how far their incompetence may have contributed to this mortality record.

Surgeons of large experience have not infrequently charged the bad results to the indisposition of the attending doctor to refer cases sufficiently early. But this has been heretofore recognized and may not be more so than formerly. Appendicitis detected early and treated promptly should involve very little risk except in those cases where there is serious impairment of vital organs.

This mortality record is apparently a challenge to medicine.

WILL THE MEDICAL PROFESSION RESPOND TO THE REQUEST FOR CO-OPERATION WITH RESPECT TO THE PROBLEM OF DRUG ADDICTION

CHAPTER 36 of the Massachusetts Legislative Resolves of 1930 gave His Excellency, Governor Allen, power to appoint a commission to inquire into the uses and abuses of habit forming drugs in this State. The studies which this commission is now making will embrace all sides of the narcotic question, not only the legal and administrative problems involved in the form of narcotic drug laws, but what is most important to the Massachusetts Medical profession—the problem of prevention and treatment of drug addiction. In order that the commission may get a clear picture of the problem as the doctors of Massachusetts see it, a brief questionnaire has been drafted and will be mailed to the profession within a few days.

Among other points raised in the questionnaire is one relating to the need of further institutional facilities for the treatment of drug addicts in Massachusetts. We are confident that the physicians will appreciate the importance of answering these questions promptly in order that the commission may have as complete knowledge as is possible regarding the situation that confronts the medical profession in connection with this most important matter.

A BULWARK OF CIVILIZATION

ALL too often the work of the medical examiner goes unhonored and unsung. Yet he is the first line of defense against homicide. If it were not for the skill and patience of the medical examiner in unravelling the first threads in the tangled web of mystery and deception that all too often surrounds a case of homicide there would be far less deterrence for the criminally inclined of our population, even in these days of rampant crime.

Perhaps with the present difficulties inherent in the administration of justice in this county there is but little need for refinement over the crude methods of shooting and bombing that are at present favored by our gangsters. But it is probable that should these cruder methods go out of style, quiet and more subtle means of extermination would be employed. An obvious murder calls for reprisals, either by rival gangs or by the tardy hand of justice. A skilfully arranged fatal illness leads only to mourning. With the passage of the "pineapple" and the "belly gun" sooner or later more refined methods must come into play and here the skill of the medical examiner in detecting poisoning, in clarifying obscure causes of death, would be a strong threat to the immunity that otherwise might be expected.

While unfortunately this country is far behind Europe in the scientific and early detection of crime and the investigation of mysterious deaths, nevertheless Massachusetts may well be proud of the position which she occupies among the American commonwealths. The study[1] of the values and shortcomings of the coroner and medical examiner systems of our great cities is both fascinating and disheartening, particularly when one contrasts the strides that Europe has made in legal medicine[2].

REFERENCES

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2 Methods and Problems of Medical Education. Ninth Series. The Rockefeller Foundation.

THIS WEEK'S ISSUE

CONTAINS articles by the following named authors:

LOCKE, EDWIN A. Ph.B., A.M., M.D. Harvard 1901. Clinical Professor, Harvard Medical School. Visiting Physician and Chief of Fourth Medical Service, Boston City Hospital. Chief of Staff, Boston Sanatorium. Visiting Physician, Sharon Sanatorium. His subject is: "Acute Empyema." Page 391. Address: 311 Beacon Street, Boston.

DAYTON, NEIL A. M.D. Ohio State University College of Homeopathic Medicine 1915. Formerly Assistant Superintendent, Wrentham State School, Wrentham, Mass. At present Director of Research and Director of Division of Mental Deficiency, Massachusetts State Department of Mental Diseases. Member of the American Psychiatric Association, American Association for the Study of the Feebleminded, New England Psychiatric Society, Massachusetts Psychiatric Society, and American Statistical Association. His subject is: "Abnormal Labor as an Etiological Factor in Mental Deficiency and Other Associated Conditions: Analysis of 20,473 Cases." Page 398. Address: Room 109, State House, Boston.

MCNAMARA, JOHN J. M.D. Tufts College Medical School 1923. Director of School Hygiene, Lowell. Address: 494 Gorham Street, Lowell, Mass. Associated with him is:

SULLIVAN, GEORGE M. M.D. University of Vermont College of Medicine 1908. State District Health Officer, Lowell. Address: Pondville State Hospital, Norfolk P. O., Mass. Their subject is: "Diphtheria Prevention in Lowell 1928 and 1929." Page 413.

WILLIAMS, LINSLY R. A.B., A.M., M.D. Columbia 1899. Director of New York Academy of Medicine and President of New York Tuberculosis and Health Association. Address: 5th Avenue and 103rd Street, New York City. Associated with him is:

HILL, ALICE M. A.B., Statistical Field Service, National Tuberculosis Association, New York City. Address: 370 Seventh Avenue, New York City. Their subject is: "On Diagnosing Pulmonary Tuberculosis as Another Condition." Page 418.

WELLMAN, HARVEY E. B.A., M.D. Harvard 1926. Assistant Physician, Division of University Health, Brown University. Medical Externe, Rhode Island Hospital and Providence City Hospital. Diplomate of the National Board of Medical Examiners. His subject is: "Psittacosis." Page 421. Address: 184 Waterman Street, Providence, R. I.

FULLERTON, W. W. M.D. College of Physicians and Surgeons, Baltimore 1895. Medical Examiner 1st Plymouth District, Massachusetts School Inspector, Brockton, Mass. Formerly Visiting Physician, Brockton Hospital. His subject is: "Two Rather Uncommon Fatal Cases of Poisoning." Page 423. Address: 106 Main Street, Brockton, Mass.

CORIAT, ISADOR H. M.D. Tufts College Medical School 1900. Formerly, Assistant Physician,

Worcester State Hospital and First Assistant Visiting Physician for Diseases of the Nervous System, Boston City Hospital. Ex-President, American Psychoanalytic Association. Member of American Psychiatric Association, New England Society of Psychiatry, Massachusetts Psychiatry Society, Research Association for Nervous and Mental Diseases, etc. His subject is: "Progress in Psychiatry." Page 424. Address: 416 Marlborough Street, Boston, Mass.

THE BOSTON MEDICAL LIBRARY

WILLIAM CHESELDEN, 1688-1752

A CATALOGUE of the medical registration at the University of Edinburgh shows that in 1760 there were 68 American students pursuing their medical studies in that institution alone. The reputation of teachers connected with the Schools in Great Britain had spread year by year to America and whereas such a number as above cited seems quite large it was undoubtedly representative of the publicity being given to those famous schools by students who had been coming over in small but ever increasing numbers for many years and had gradually disseminated their knowledge and demonstrated their skill among the colonists. The subject of this sketch was one whose renown had spread to America, for patients had heard of his surgical skill and had frequently crossed the water to be relieved of the tortures of vesical calculi. His time was prior to that when pathological anatomy had made any contributions of value to the surgeon and Cheselden, like all the men of his time, entered the domain of surgery through the gate of anatomy. He was perhaps as distinguished as an anatomist as he was in the clinical field unless perchance his particular facility in "cutting for the stone" may have turned the scale on the side of surgical predominance. He was born in Burrough, a town in Leicestershire, on October 19, 1688. His early training, prior to his beginning the study of medicine under a preceptor, will not be recorded here as it was only commonplace. His first apprenticeship was with Mr. Wilkes of Leicestershire. In 1703 it is stated that he was in London, a pupil of William Cowper, the distinguished anatomist. At about that time he was apprenticed to one of the surgeons of St. Thomas Hospital. This was a Mr. Ferne. After Cowper's death he seems to have stepped into his place as a teacher of anatomy, having prepared a syllabus for a course of 35 lectures and these were repeated four times during the year. Their preparation evidently must have made heavy demands upon his time for he undertook some of the dissecting which was necessary for his demonstrations in his own home for which breach of the rules of the Barber-Surgeons Corporation he was disciplined but finally exonerated and allowed to give his course at St. Thomas Hospital which he continued to do for twenty years. In 1718, after two unsuccessful attempts to secure appointment to the staff of St. Thomas Hospital, he was given this honor and devoted himself to operative surgery. It was at that time the custom to grant special licenses to those qualified to perform lithotomy and Cheselden's preceptor, Mr. Ferne, was one of those so qualified, which probably accounts for the fact that he had an especial interest and developed special skill in the performance of this operation.

He spent several years in the perfection of his technique and in effecting modifications in the methods of others until he finally settled upon a procedure known as the "lateral operation for the stone" which was virtually his own and was his most distinguished contribution to surgery. Surgeons came from Paris and other more remote localities to observe and learn his technic. It was in 1723 that he first began to write about the procedure but it was not until four years later that he first performed this classical operation.

In 1712 as a result of a short paper presented before the Royal Society upon certain remains of human bones discovered in an urn which was unearthed at St. Albans, he was elected a member of that society. He was not a prolific writer and has not left much behind him to enrich medical literature. The Proceedings of the Royal Society have a few communications, notably some observations upon morbid anatomy and one upon an ophthalmic operation said to have been the forerunner of a well recognized procedure among ophthalmic surgeons. His Anatomy of the Human Body was extensively used, running through thirteen editions, and though the text has been criticised for its brevity, the illustrations were accurate and had great artistic merit. He had a large practice among the upper circles of society. Fees seem to have been rather high as it is said that he had received as much as £500 for his operation for stone. He was for a time Surgeon to Queen Caroline and was called in consultation to the death bed of Sir Isaac Newton. He moved in good society, was a friend of Pope and Jonathan Richardson, the artist, who paid him the compliment of painting a portrait of him, now in the College of Surgeons. In 1729 he was made a corresponding member of the French Academy of Sciences and was the first foreign associate elected to the Royal Academy of Surgery in Paris. He was one of the last wardens of the Barber-Surgeons Corporation and it is thought by some that he was to a considerable extent responsible for the separation, in 1744, of the barbers from the surgeons. Among British Surgeons he has always held a very high rating. He was a brilliant operator, had a very strong mechanical instinct, possessed a considerable taste for literature, was quite interested in athletics, particularly boxing, and

is said to have drawn the plans for the bridge at Putney, across the Thames. He was socially popular and much beloved by his patients. Contacts with men of this type must have made a deep impression upon the raw medical recruit from the Colonies.

MISCELLANY

DR. EDWARD S. COWLES NOT RECORDED BY THE AMERICAN MEDICAL ASSOCIATION AS A GRADUATE OF THE HARVARD MEDICAL SCHOOL

The death of Mr. Swift in Dr. Edward S. Cowles' sanitarium in New York City has brought into publicity again some of the facts relating to Dr. Cowles. Some of the papers reported that Dr. Cowles is a graduate of the Harvard Medical School which is not in accord with his record in the Directory of the American Medical Association where his graduation is given as from the University College of Medicine of Richmond, Virginia.

Dr. Cowles tried repeatedly to secure registration in Massachusetts but was never found qualified by the Board of Registration in Medicine.

Anyone interested in the personal and professional history of this man may find significant material in the files of the Massachusetts Board of Registration in Medicine.

CORRESPONDENCE

AN OPPORTUNITY FOR DOCTORS TO HELP IN A SERIOUS STUDY

The Commonwealth of Massachusetts
Department of Public Health
State House, Boston
August 21, 1930.

New England Journal of Medicine,
165 Newbury Street,
Boston, Massachusetts.

Gentlemen:

The legislative commission appointed at the suggestion of His Excellency Governor Allen to study narcotic addiction in Massachusetts is sending a letter to each physician in the State requesting information as to certain details of addiction found in his practice. This is a matter in which there is an increasing interest over the world and which has not been seriously studied in Massachusetts for some fifteen years. For obvious reasons it is difficult to obtain precise data and therefore the commission is regretfully imposing on the physicians. May we through your columns bespeak coöperation for this matter which is of vital interest to the well-being of our citizens.

Yours truly,
GEORGE H. BIGELOW, M.D.,
Commissioner of Public Health.

A REJOINDER BY DR. WOODWARD

August 13, 1930.

Mr. Editor:

Walter B. Swift, A.B., O.B., S.B., M.D., B.L.I., misunderstands my casual reference to a journal advertisement in my talk to Harvard Medical students last February.

His rather excited letter of July 3 in which he refers to my supposed knowledge of God (never claimed by me), wonders why I should quote poetry, thinks I ought not to occupy so much space in "Who's Who in New England" (17 lines to his 40) etc., etc., was preceded by a letter to me by Mrs. Swift in which, among other unpleasant ideas, she expresses her opinion that if I do not learn to do better on earth I "will not get very far on the other side".

I readily accept Dr. Swift's statement that his "degrees do not begin to show the extent of his training," deny that "these are obnoxious to me" or that they "stagger my understanding of how they are necessary to cover the numerous phases of his medical specialty", but I thought then and I think now that the card in question violates good taste, is an example of how not to do it and should not be imitated by other physicians.

SAMUEL B. WOODWARD.

RECENT DEATH

PIKE—DR. WINFRED CARLE PIKE, a Fellow of the Massachusetts Medical Society and a member of the Suffolk District, died at his summer home at Cape Elizabeth, Me., of heart disease, August 21, 1930, at the age of 62.

He was a native of Cornish, Me., and a graduate of Tufts College Medical School in the Class of 1900. Settling in Boston he devoted himself to general practice. He held fellowship in the American Medical Association. Dr. Pike is survived by his widow, Mrs. Rosa M. Best Pike.

SOCIETY MEETINGS, CONGRESSES AND CONFERENCES

March-October — International Medical Postgraduate Courses in Berlin. Complete notice appears on page 853, issue of October 24, 1929.

September 8-12—Postgraduate week of Physical Therapy. Detailed notice appears on page 1025, issue of May 22.

September 14-18 — Fifth International Congress on Physiotherapy. Complete notice appears on page 906, issue of October 31, 1929.

September 16-17-18—Clinical Congress of the Connecticut State Medical Society. Complete notice appears on page 194, issue of July 24.

September 26-27—New England Surgical Society. Detailed notice appears on page 1028, issue of May 22.

October 13-17—Clinical Congress of the American College of Surgeons. Complete notice appears on page 1175, issue of June 12.

October 20-24—International Assembly of the Interstate Postgraduate Medical Association of North America. Detailed notice appears on page 291, issue of August 7.

October 27—The American Public Health Association. Detailed notice appears on page 1271, issue of December 19, 1929.

March 23-27, 1931 — Fifteenth annual clinical session of the American College of Physicians. Detailed notice appears on page 790, issue of April 17.

July 27-31, 1931—Third International Congress of Radiology, Paris. Complete notice appears on page 385, issue of August 21.